Intensive Agriculture

NOVEMBER 1963

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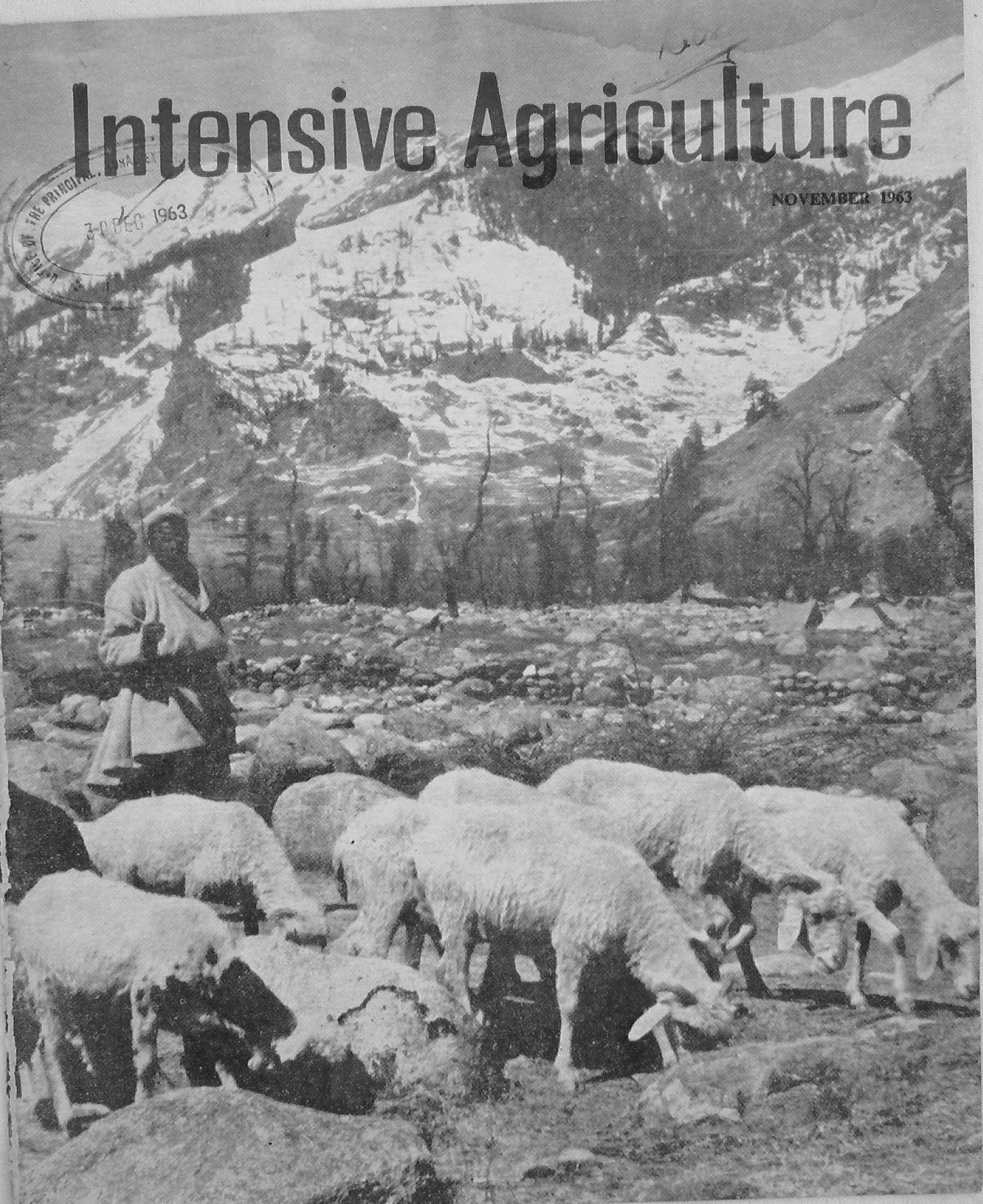

Intensive Agriculture

VOLUME 1, No. 9 NOVEMBER 1963

THE PICTURE ON THE COVER

In the rugged valleys between the snow-clad Himalayan ranges in Mandi District of Himachal Pradesh, sheep rearing for wool is time-honoured profession. But being of an inferior stock, the sheep would yield less wool and that too of a not very good quality. Now under the Indo-German Agricultural Project in the District, German sheep is being used to upgrade the local stock.

—Photo by J. H. Gwildis

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Ministry of Food and Agriculture
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New Delhi

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CHOOSE THE BREED ACCORDING TO YOUR NEED

By
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New Delhi

There are several important breeds of cattle and buffaloes in India; some are good as work-animals while some are good milkers. See which one of these breeds suits your needs.

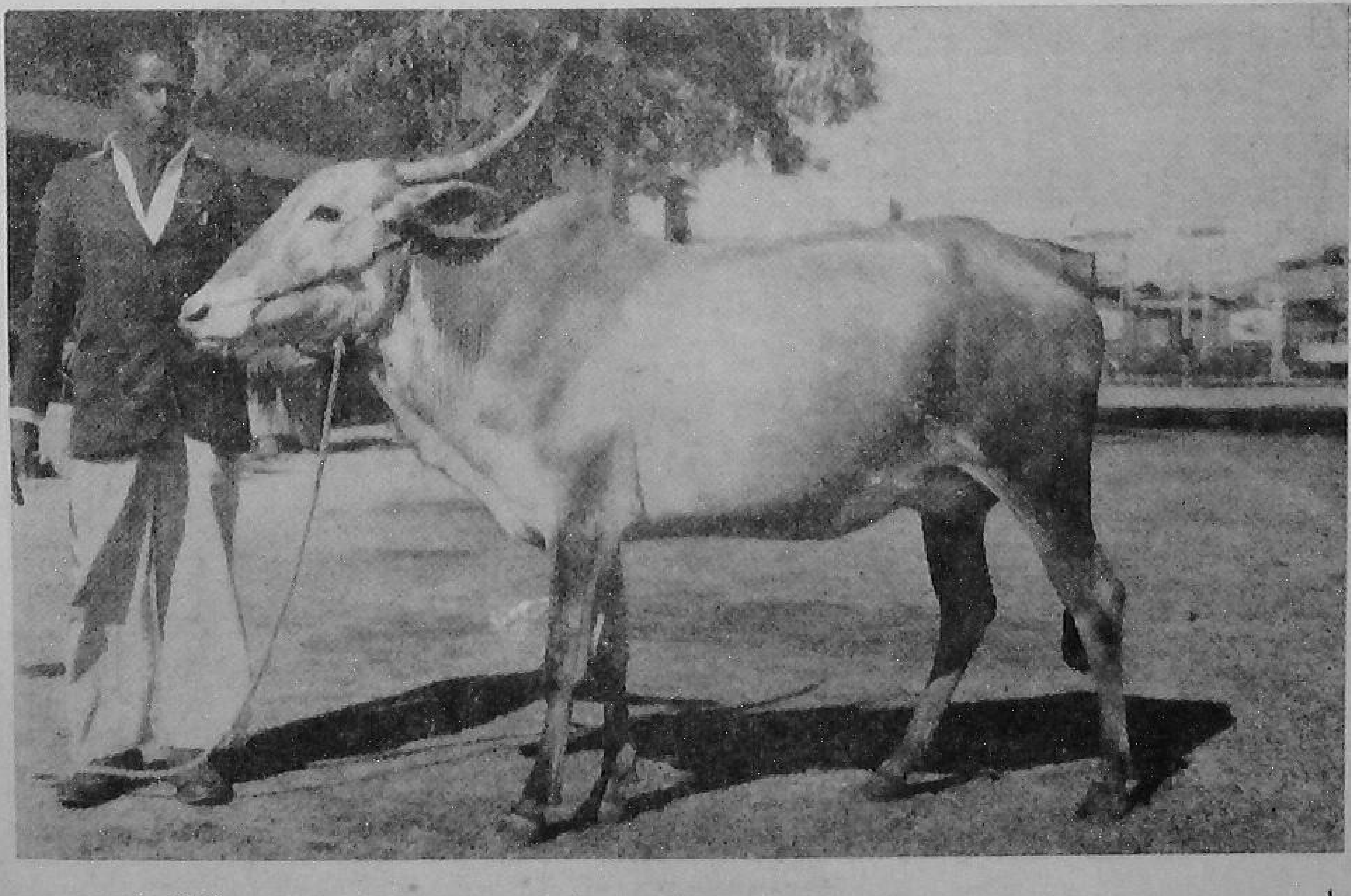
THERE are twentysix important breeds of cattle, distributed all over the country. Red Sindhi, Sahiwal and Tharparkar breeds have their tracts in Pakistan, but a number of well-bred herds of these breeds are found in India also.

And among domesticated buffaloes, there are six distinct breeds.

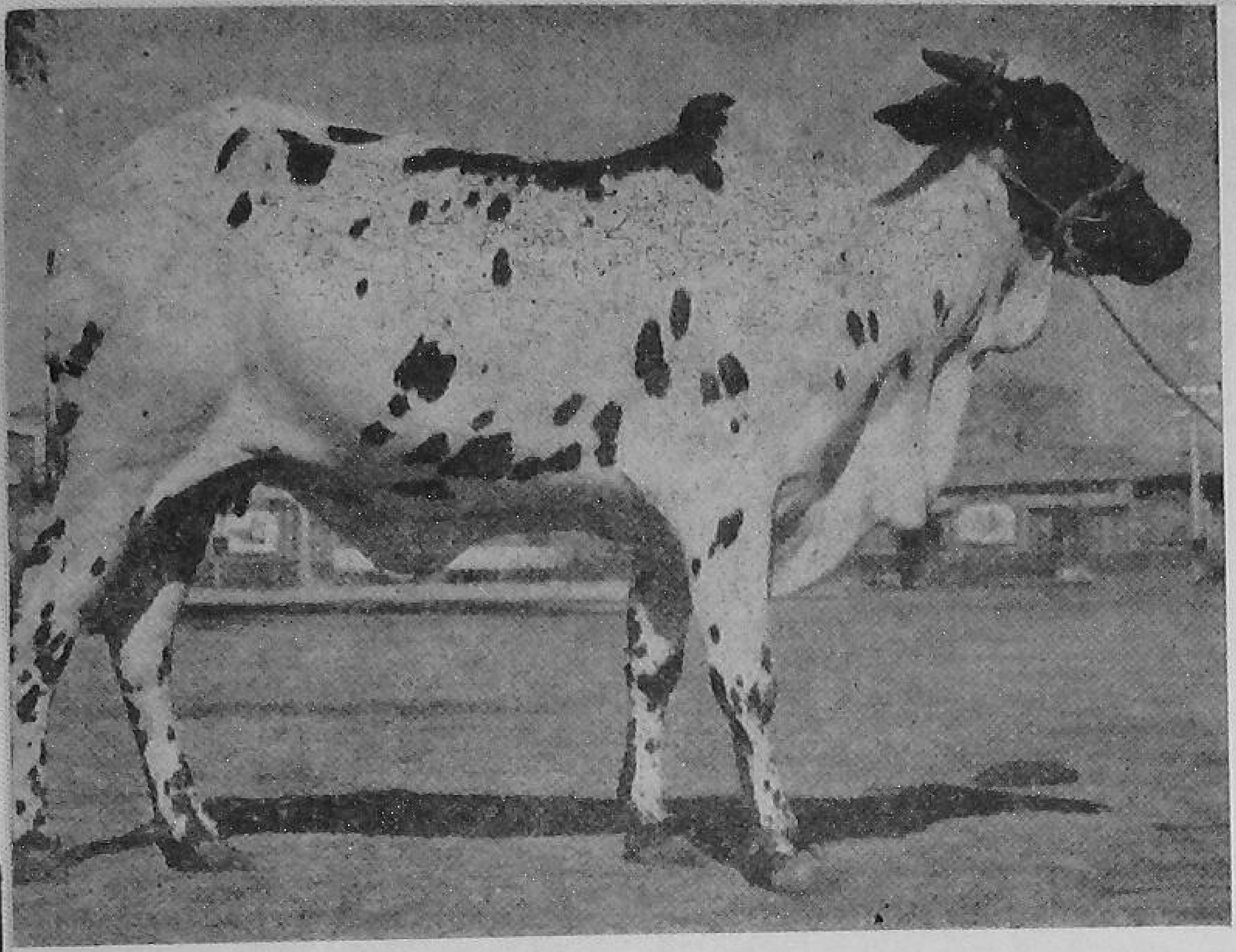
The breeds can be broadly classified into three classes, viz., milch, draught and dual-purpose or general-utility breeds. The females of the dual-purpose breeds are fairly good milkers and the bullocks are useful for draught purpose.

AMRITMAHAL

The home of this breed is in Mysore State. The animals are usually grey in colour. But the head, neck,



AMRITMAHAL
A good draught animal



DANGI

A hardy worker for heavy rainfall areas

hump and quarters are darker. In some cases the grey-white markings are present on dewlap and face.

Amritmahal is a good draught breed. The bullocks are active and fast trotters; they are well-known for their power of endurance. The cows are poor milkers.

BACHAUR

The breed takes its name from a *pargana* in Bihar. It is found mostly in Bachaur *pargana* of Dharbhanga, Koilpur *pargana* of Bhagalpur and Sitamarhi sub-division of Muzaffarpur Districts of Bihar. The animals are grey in colour.

Bachaur is essentially a draught breed. The bullocks are good work-animals, but the cows are poor milkers.

BARGUR

Bargur is bred extensively in the Bargur hill forest in Coimbatore District of Madras State. The animals are usually red and white, sometimes light grey.

The bullocks are fiery and are known for their trotting speed. The cows are poor milkers.

DANGI

This breed is found in Akola *taluk* of Ahmednagar District, Sonkhad *taluk* of Khandesh District, *ghats* of Nasik, Thana and Colaba Districts of Maharashtra, old States of Bansda, Dharampur, Jawahar and Dangs.

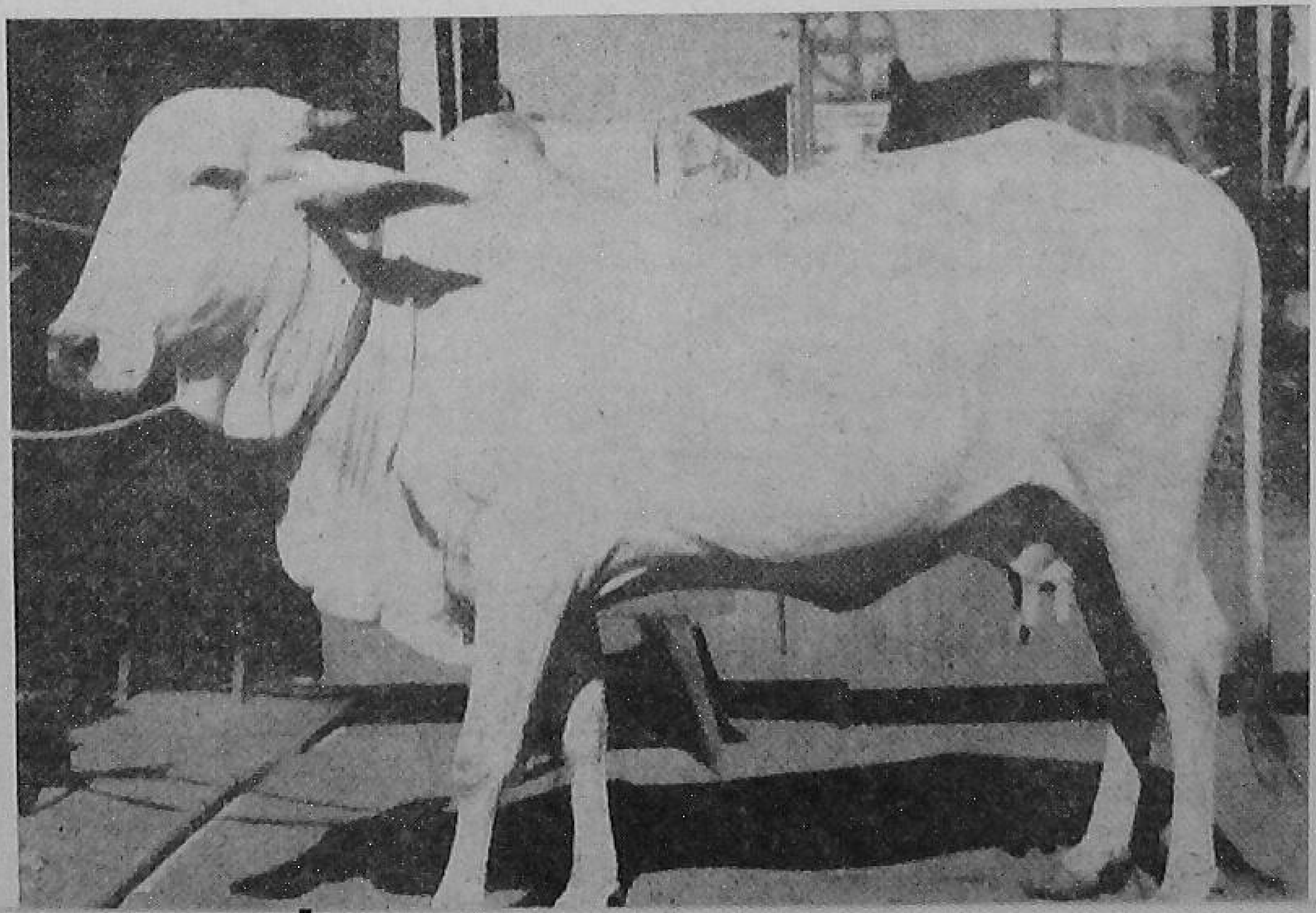
The animals are red and white or black and white in colour. The bullocks are hardy, especially suitable for heavy rainfall areas in west India. The cows are generally poor milkers.

DEONI

This breed belongs mainly to the north-western and western areas of old Hyderabad State. The body

GAOLAO

Fair milkers and good workers



colour varies, but usually it is patchy with black and white spots.

The bullocks are particularly suitable for heavy cultivation. The cows are fairly good milkers.

GAOLAO

This breed is found mostly in Chindwara, North Wardha and Nagpur Districts of Maharashtra. The cows are usually pure white in colour. But in males, the head, neck, hump and quarters are grey.

Gaolao cows are fair milkers; the bullocks make useful work cattle.

GIR

The home of this breed is in the Gir forests of South Kathiawar in Gujarat. The colour of the breed varies greatly through all stages of mottling in various shades of red and white to almost black and white or entirely red or white.

Gir cows are good milkers. The bullocks are heavy and powerful animals but are slow. They are, however, extensively used as draught animals in their own region.

HALLIKAR

The breed is bred mainly in Tumkur, Hassan, and Mysore Districts of Mysore State. The usual colour of the breed is dark grey, almost black with light grey markings on the face, dewlap and under the body is also not uncommon.

It is draught breed useful for both road and field work. The cows are poor milkers.

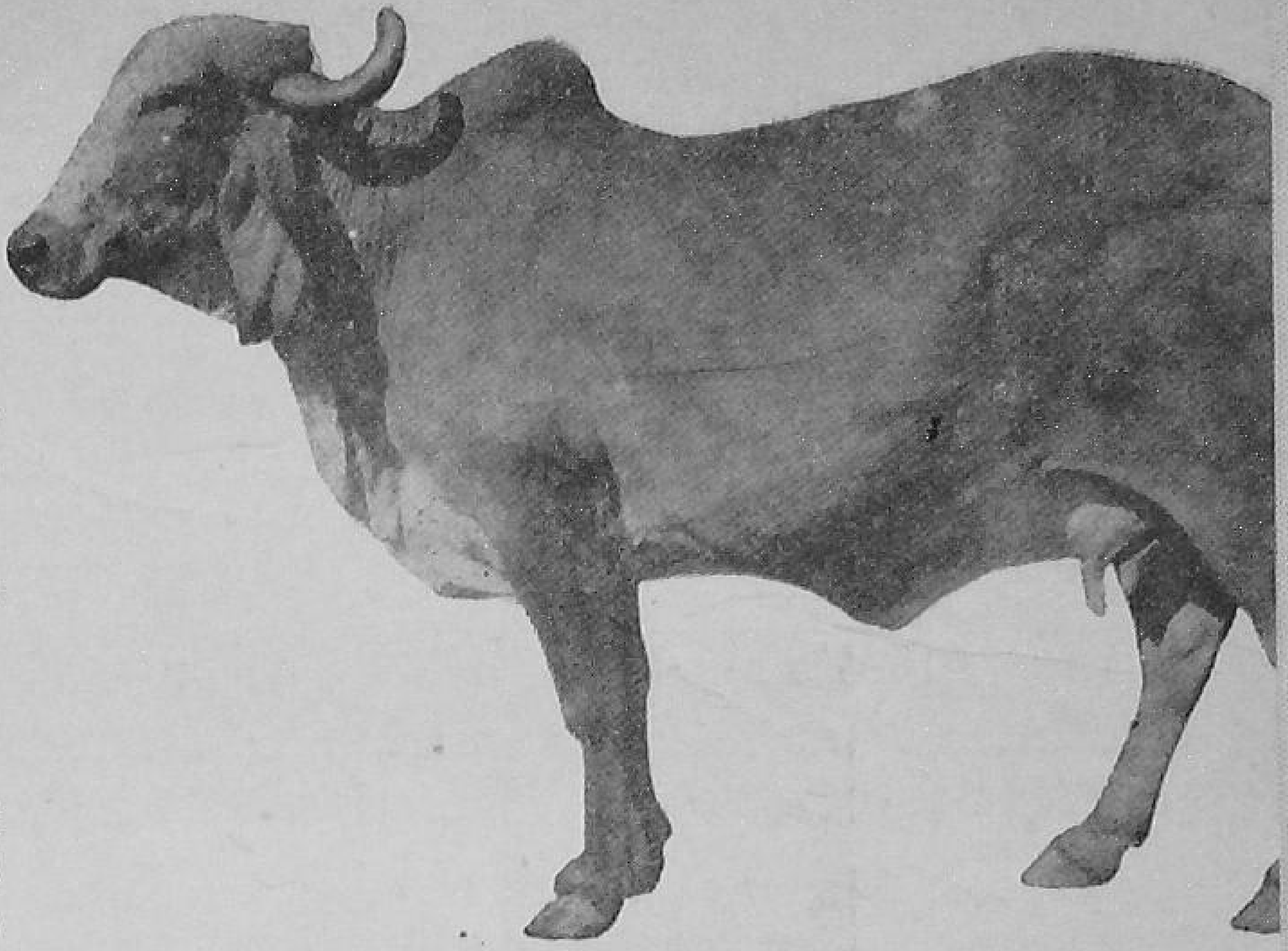
HARIANA

Hariana is bred particularly in Rohtak, Hissar, Karnal and Gurgaon Districts of the Punjab and the Union Territory of Delhi. The animals are white or light grey. The bull has dark grey head, neck, hump and quarters.

It is a dual-purpose breed. The bullocks are particularly good work-animals, especially for fast ploughing and road transport. The cows are good milkers.

KANGYAM

Its home is in southern and south-eastern *taluks* of Coimbatore District of Madras State. The animals are usually grey or white in colour.



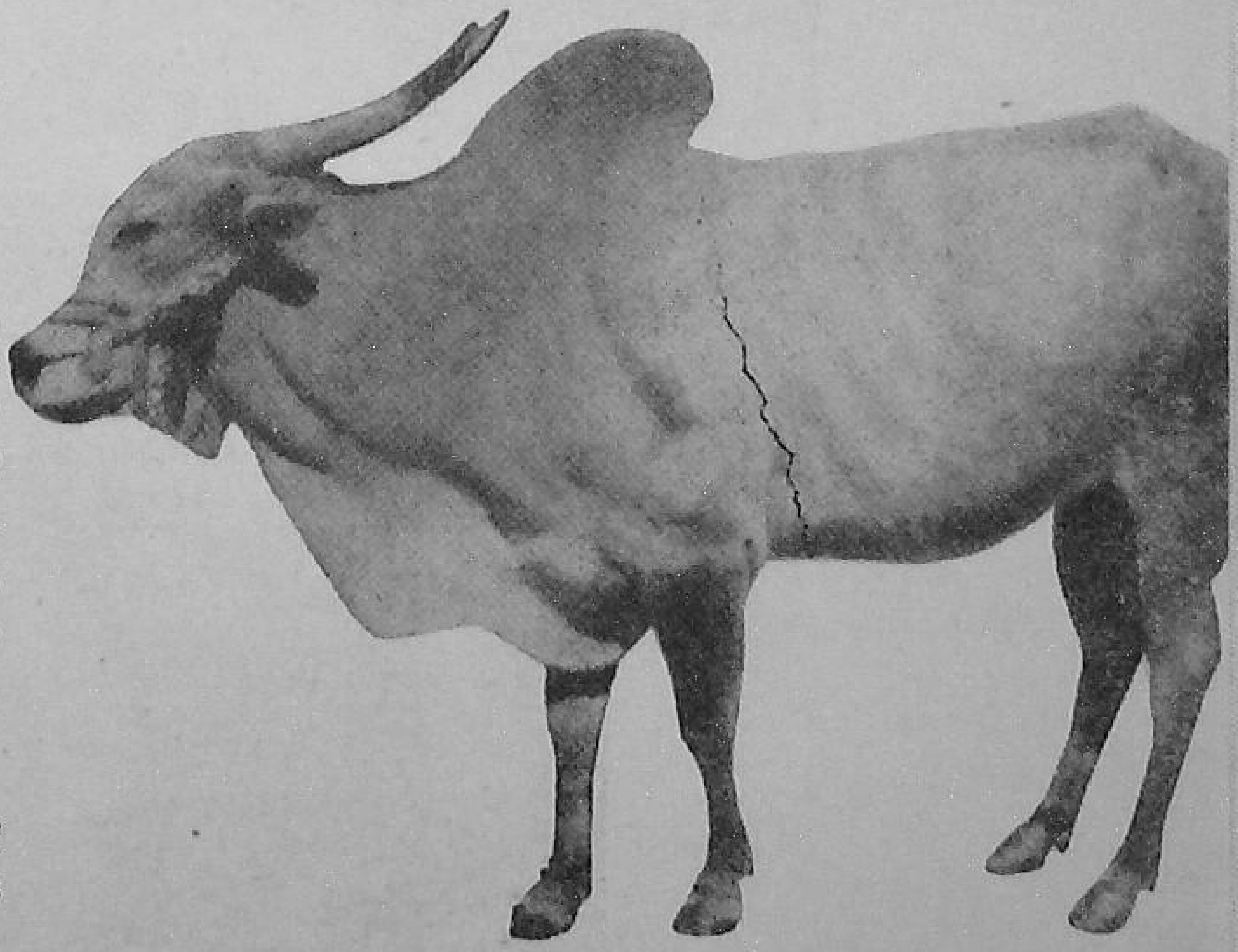
GIR
Good milkers and powerful workers

The bullocks are strong draught animals. The cows are generally poor milkers.

KANKREJ

The breed is found in the area south-east of the Rann of Kutch and Ahmedabad District and from

HALLIKAR
A draught breed for road and field work



Dessa in the east to old Radhanpur State in the west, particularly along the Banas and Saraswati rivers. The colour of the animals varies from silver grey to iron grey or steel black.

The bullocks are very highly prized as fast, powerful draught cattle. The cows are fairly good milkers.

KENKATHA

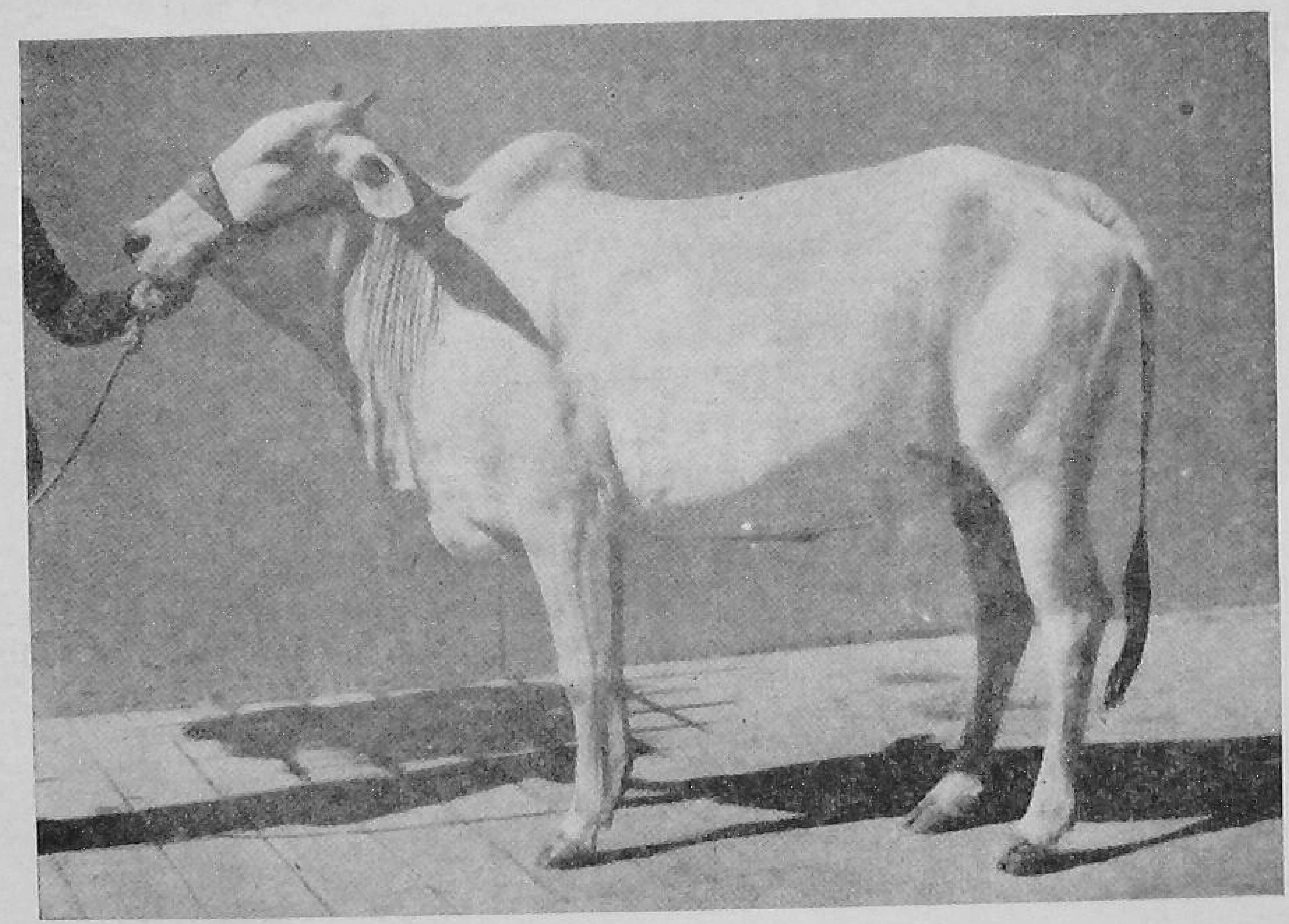
The home of this breed is along the river Ken in Banda District of Uttar Pradesh and parts of central India. The colour of the animals varies from grey on the barel to dark grey on the rest of the body.

The bullocks are small but are fairly sturdy animals, popular for light draught on the road and for cultivation. The cows are poor milkers.

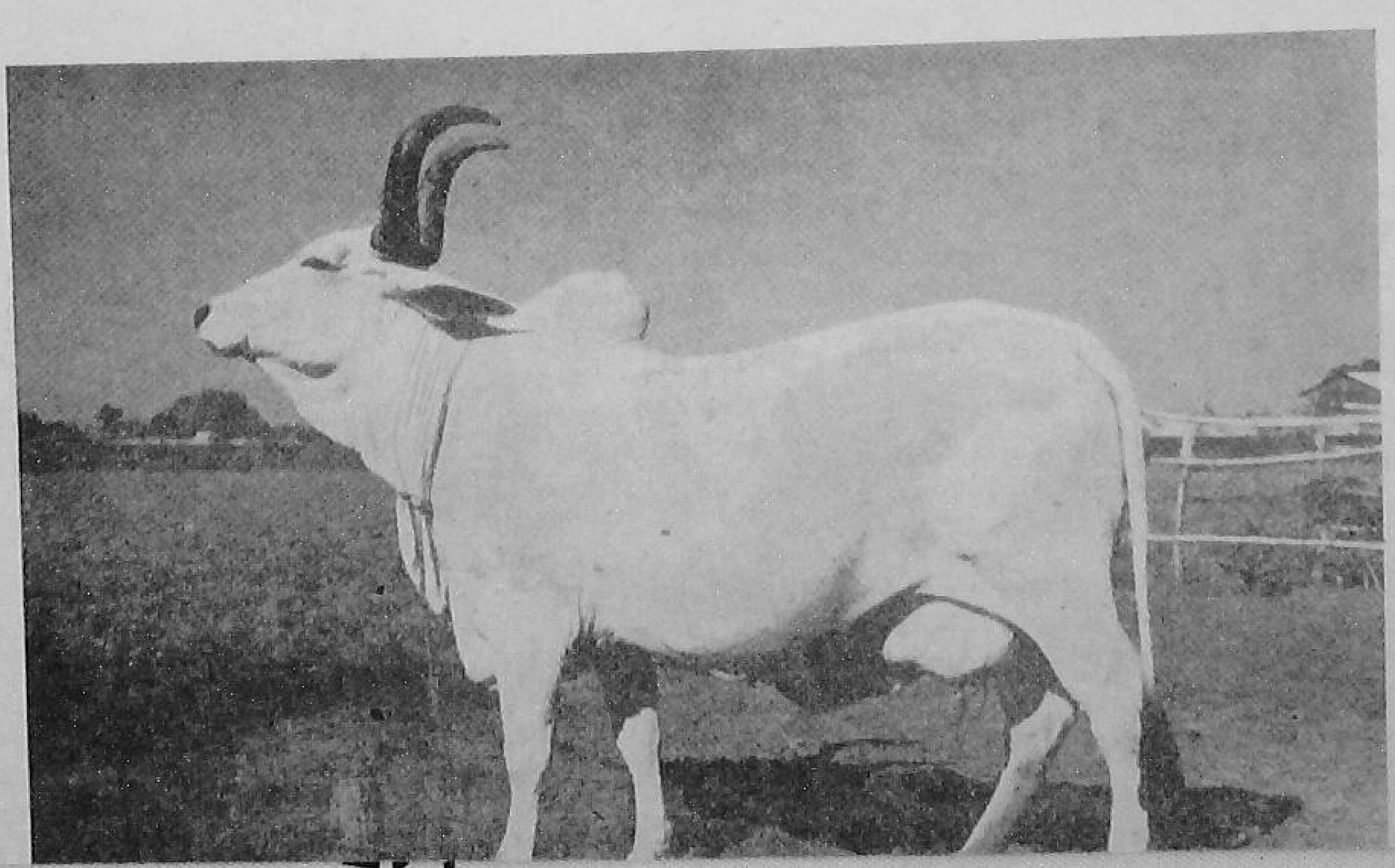
KHERIGARH

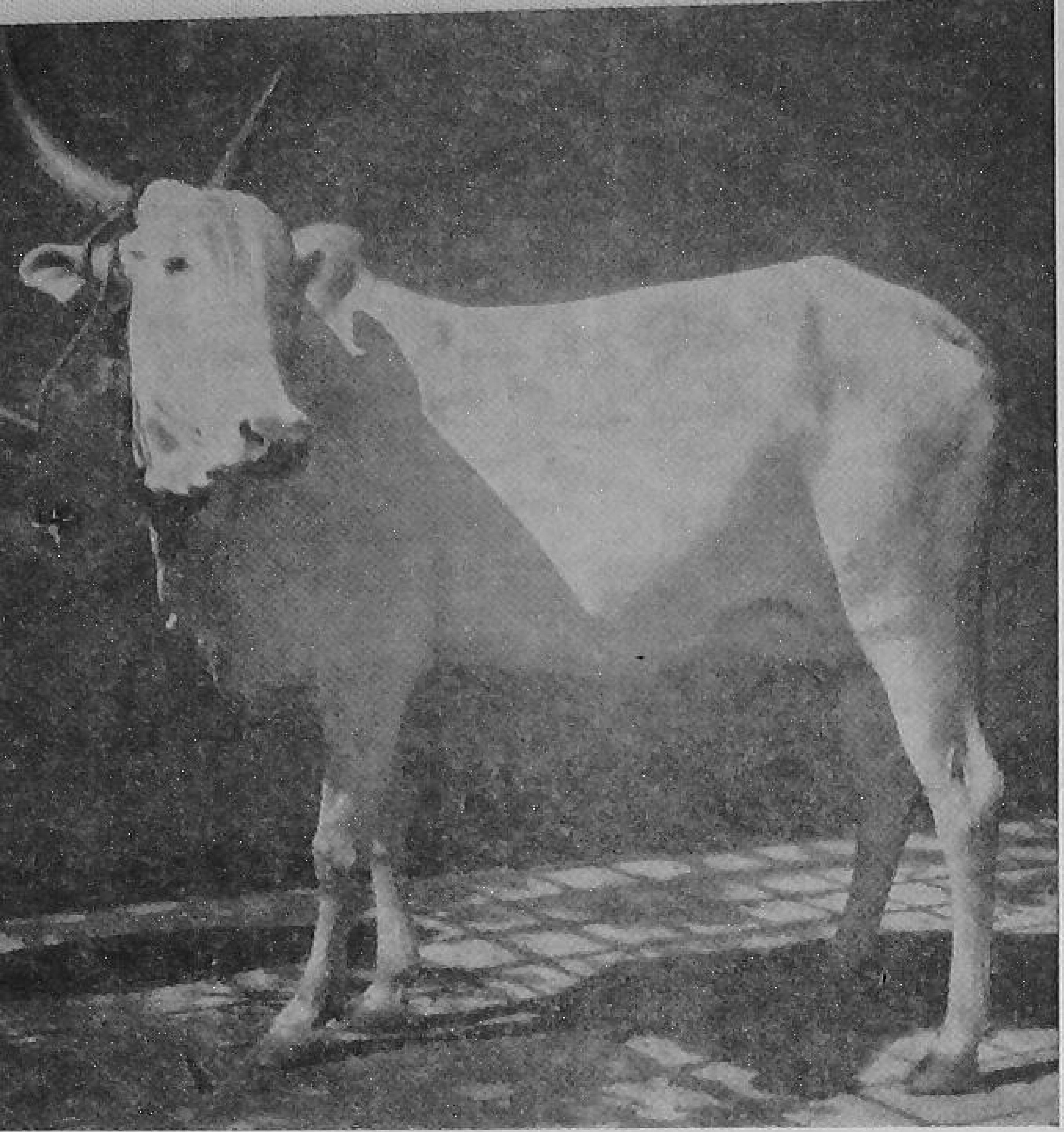
The breed is found in Kherigarh *pargana* of Kheri District in Uttar Pradesh. These animals are generally white in colour.

HARIANA
A dual-purpose animal



KANKREJ
Good for draught





KHILLARI
A good draught animal

MALVI

The breed is located in Malwa tract of central India. The usual colour is grey, deepening in the mature male to a dark iron grey. The cows and bullocks eventually become white with age.

The bullocks are popular for medium and light draught on the road and for cultivation purposes.

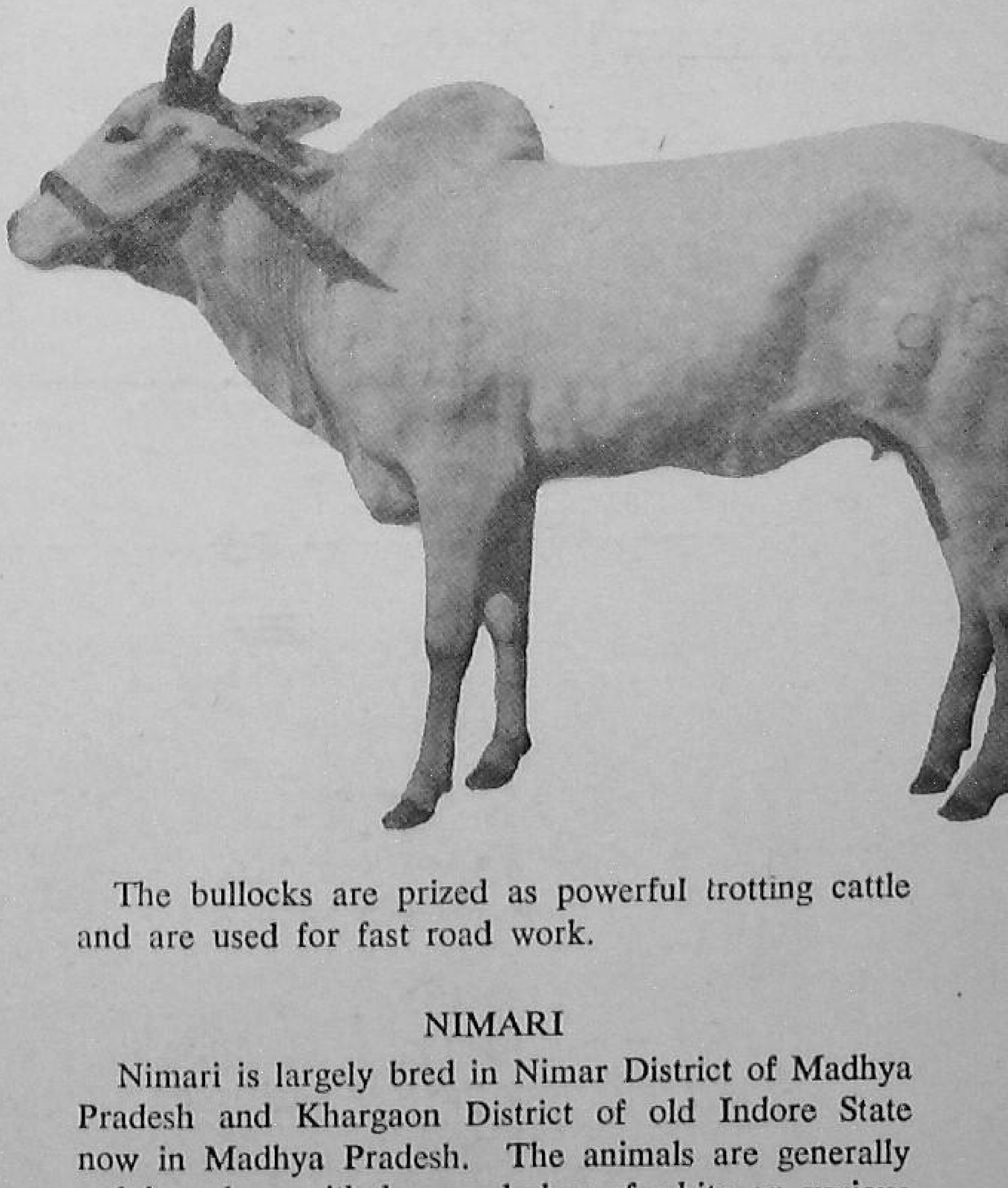
MEWATI

The breed is located in Kosi tract of Mathura District in Uttar Pradesh, and in Alwar and Bharatpur in Rajasthan. The animals are generally white in colour, tending to be dark in the head, neck and shoulders.

The bullocks are useful for ploughing and carting. The cows are good milkers.

NAGORE

Its home is in the north-east of Jodhpur region in Rajasthan. The animals are generally white or grey in colour.



NAGORI
Powerful trotters for road work

The bullocks are good for light draught and trotting purposes. They are well-suited for the Tarai tract. The cows are poor milkers.

KHILLARI

Khillari is bred mainly in southern parts of Maharashtra, partially in Sholapur and Satara Districts and the Satpura range. The animals are grey-white in colour.

The bullocks are well-known for their strength, and are popular as fast draught animals. The cows are poor milkers.

Its home tract is in parts of Krishna river watershed. The colour of the animals varies, but is commonly grey-white.

The bullocks are powerful animals, useful for slow draught or heavy ploughing. The cows are generally fair milkers.

The bullocks are prized as powerful trotting cattle and are used for fast road work.

NIMARI

Nimari is largely bred in Nimar District of Madhya Pradesh and Khargaon District of old Indore State now in Madhya Pradesh. The animals are generally red in colour with large splashes of white on various parts of the body.

The bullocks are good at work. The cows are generally poor milkers.

ONGOLE

This breed's home is in Nellore and Guntur Districts of Andhra Pradesh. The animals are white in colour. The male has dark grey markings on the head, neck and hump.

The bullocks are powerful, suitable for heavy ploughing or cart work. The cows are good milkers.

PONWAR

The breed is located in Puranpur sub-division of Pilibhit and north-western part of Kheri Districts of Uttar Pradesh. The animals are generally black and white in colour.

The bullocks are suitable for draught purposes and fast work. The cows are poor milkers.

RATH

Rath is bred in north and west of Alwar and in the adjacent territory in Rajasthan. The animals are white or grey in colour.

The bullocks are suitable for plough-work and on the road. The cows are fair milkers.

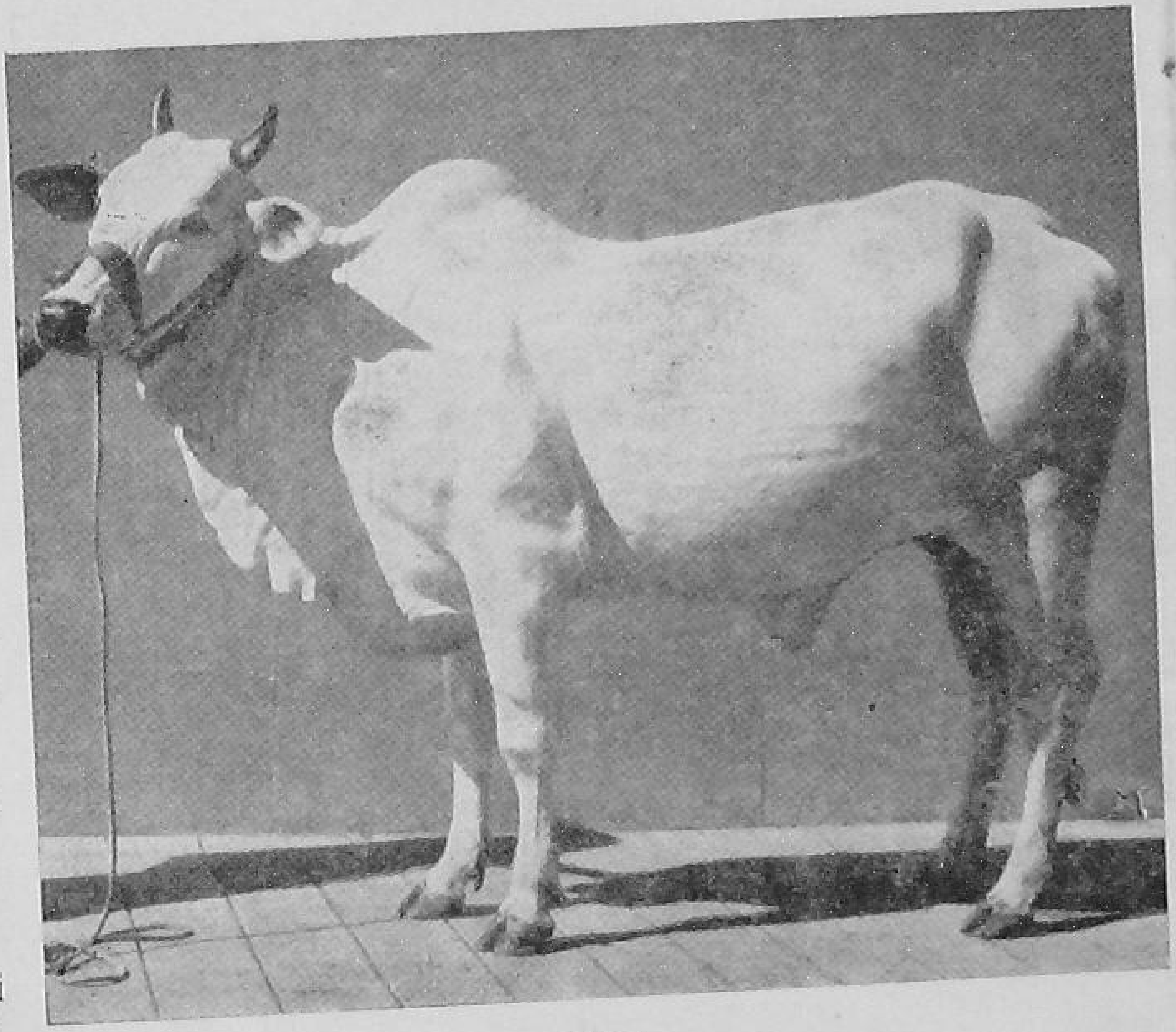
RED SINDHI

The home of this breed is in the area around Karachi and north-west of it in Pakistan. It is generally red or fawn in colour. It is a well-known milch breed, and the cows are good milkers.

SAHIWAL

The breed belongs to area in the neighbourhood of Ravi and Nili Bar particularly in Montogomery District of Pakistan. The animals are commonly of reddish dun colour with or without white splashes.

The cows are well known for their milking capacity. The bullocks are slow workers.



ONGOLE
Good milkers and good for plough

SAHIWAL
Good milch breed

SIRI

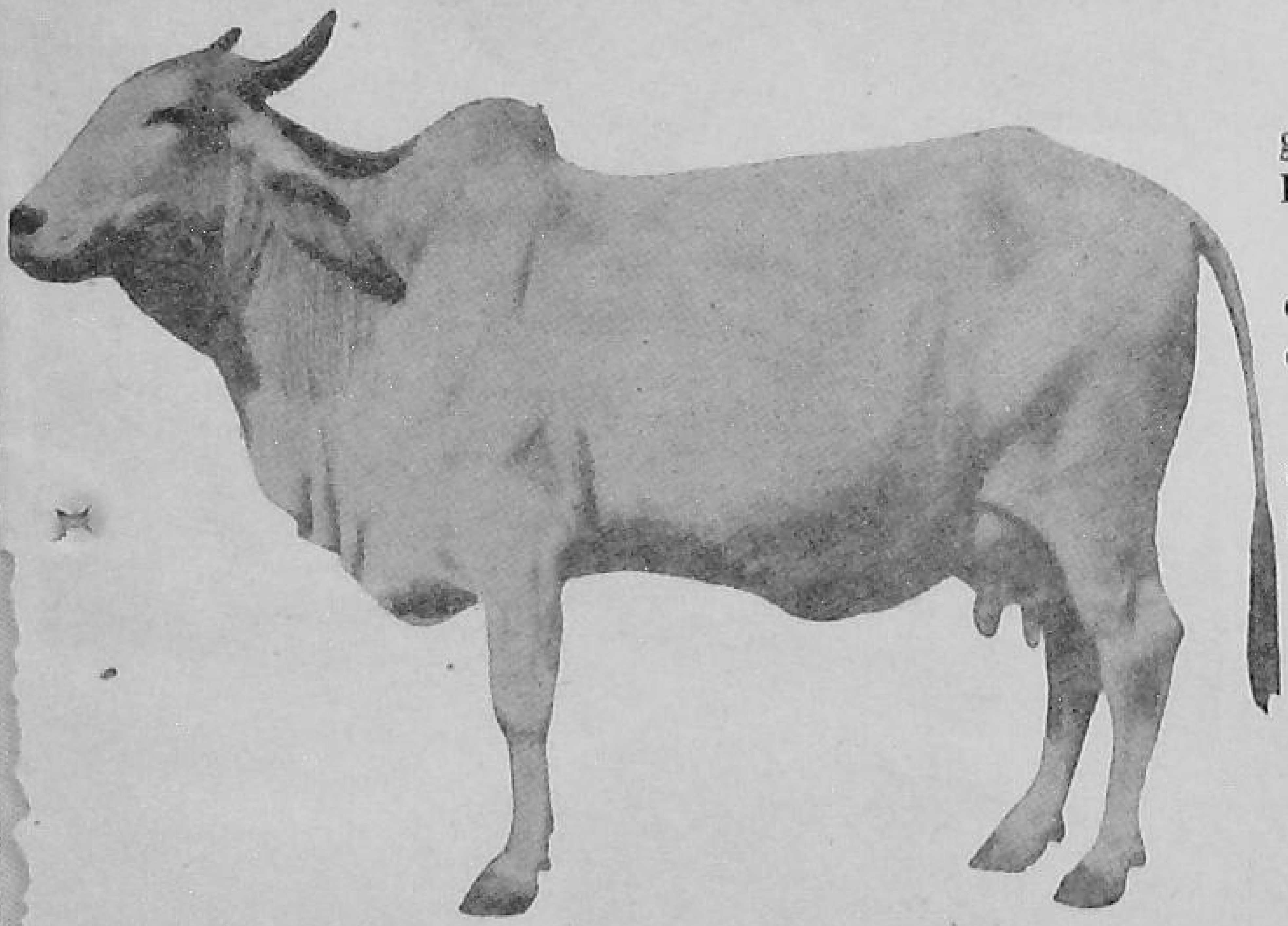
The breed is found in the hill tracts around Darjeeling, Sikkim and Bhutan. The animals are commonly black and white or red and white in colour.

The bullocks of this breed are useful for pulling carts. The cows are fair milkers when stall-fed.

THARPARKAR

Its home tract is the south-east Sind, Pakistan. The animals are generally white or grey in colour. In young animals, there is usually a white or light grey line along the spine.

The bullocks are good work-animals for the plough or the cart. The cows are good milkers.



THARPARKAR
Good for plough and cart work

BREEDS OF BUFFALOES

JAFFARABADI

This breed is found in the Gir forests and neighbourhood of Jaffarbad in Saurashtra region in Gujarat State. The animals are usually black in colour.

The females are heavy milk yielders with a high butter-fat content.

MEHSANA

This breed is found mostly in Baroda and Mehsana Districts and the adjoining areas in Gujarat. The animals are black or fawn-grey usually with white markings on face, legs or tip of the tail. Mehsana buffaloes are valuable as economical producers of milk and butter-fat.

MURRAH

The animals are bred in Rohtak, Karnal and Gurgaon Districts of the Punjab and adjoining areas of Delhi.

The name Murrah means curled and refers to the curled horns of the animal. Closely-curled horns indicate quality and good breeding.

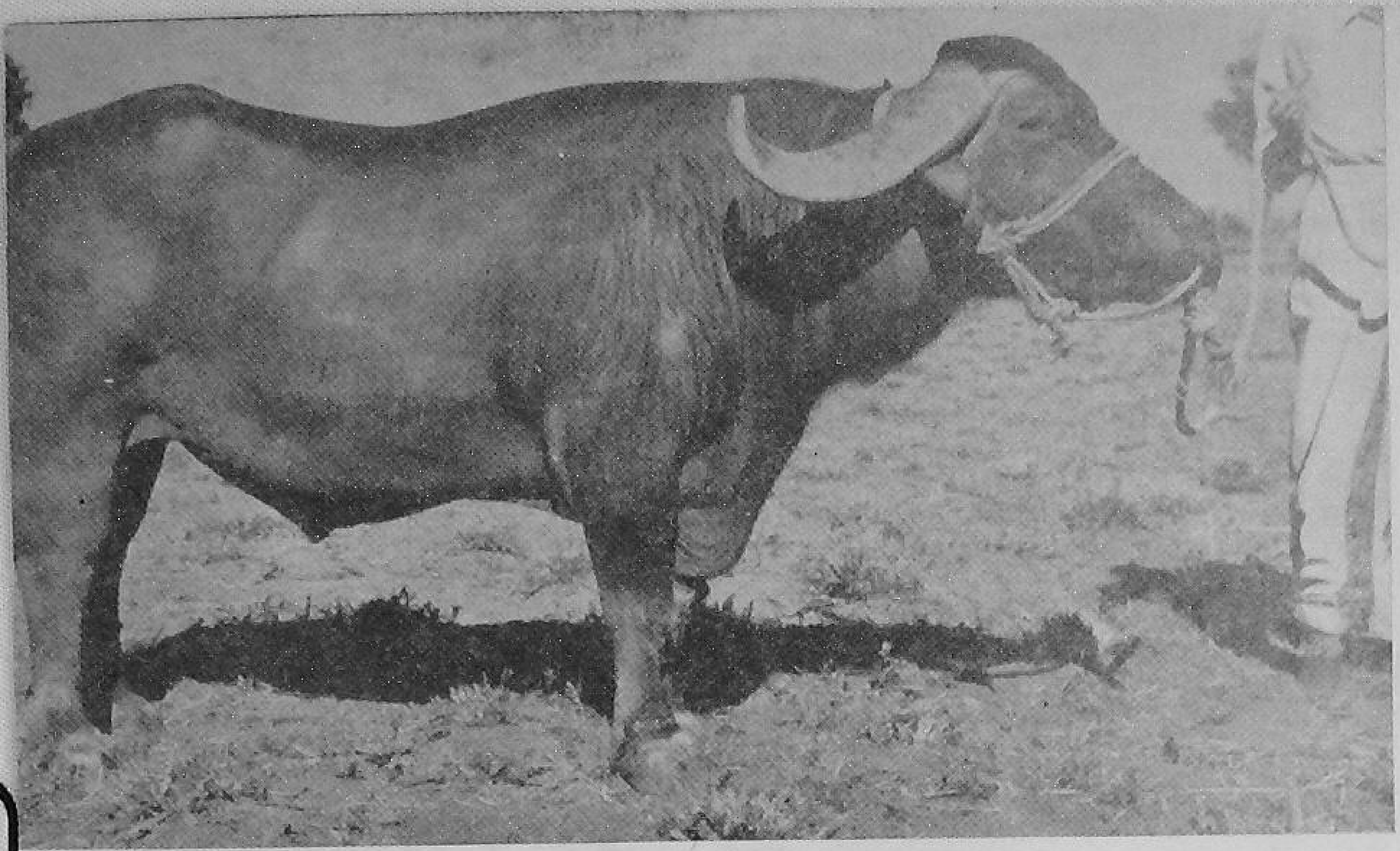
The usual body colour is jet black. The buffaloes are one of the most efficient milkers and butter-fat producers.

NAGPURI

This breed is also known as Ellichpuri. These animals are largely found in Nagpur, Wardha and Brar Districts and adjoining areas in Maharashtra State.

The animals are usually black in colour; in some cases there are white patches on the face, legs and the tip of tail. The buffaloes are fair milkers while the males

MURRAH
Efficient milkers

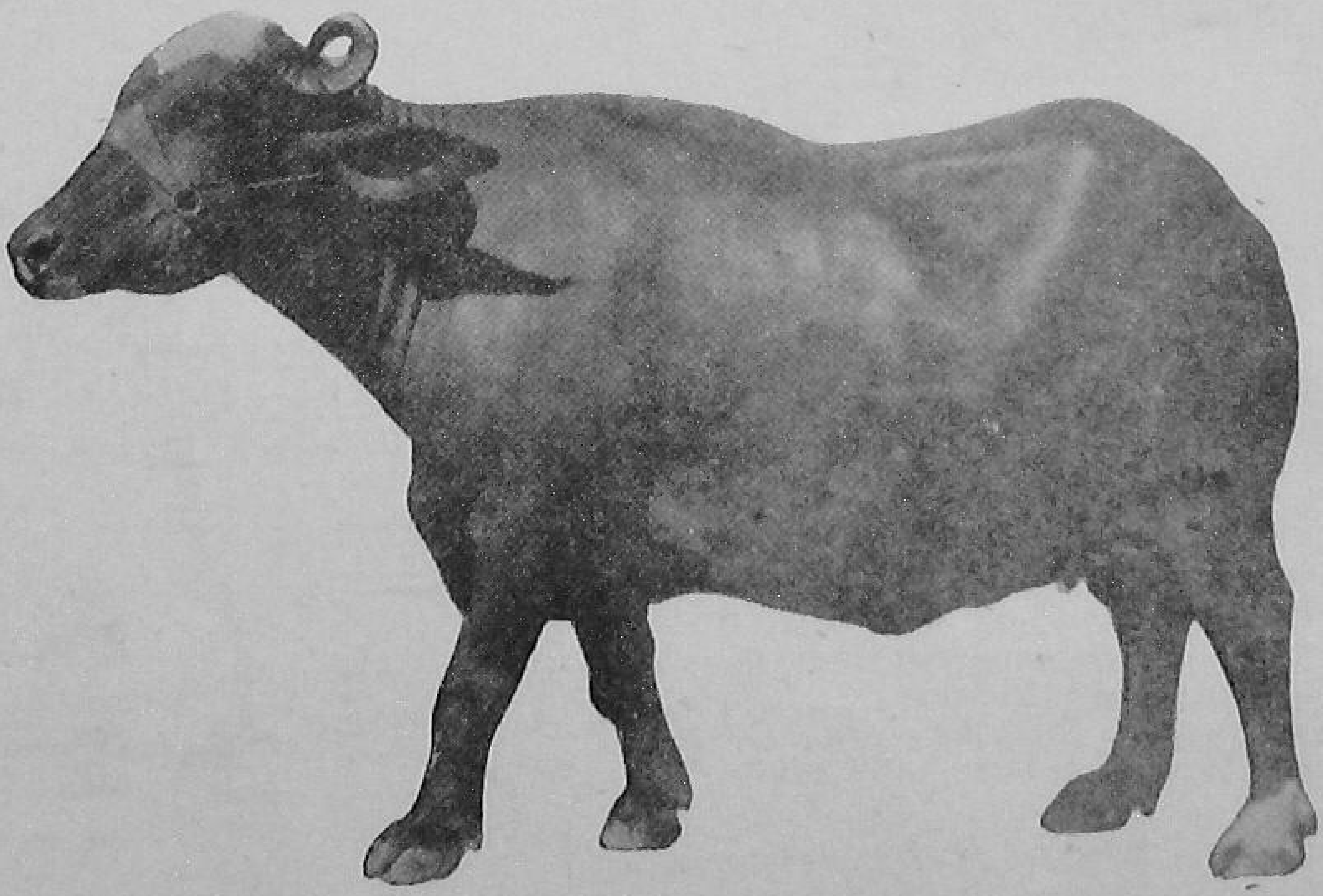


SURTI
A good milk-yielder

though slow in movement are used for heavy draught work.

NILI

These buffaloes are found in the valley of the river Sutlej, particularly in Ferozepur District of the Punjab and parts of Montogomery District of West Pakistan.



NILI
A high milk-yielder

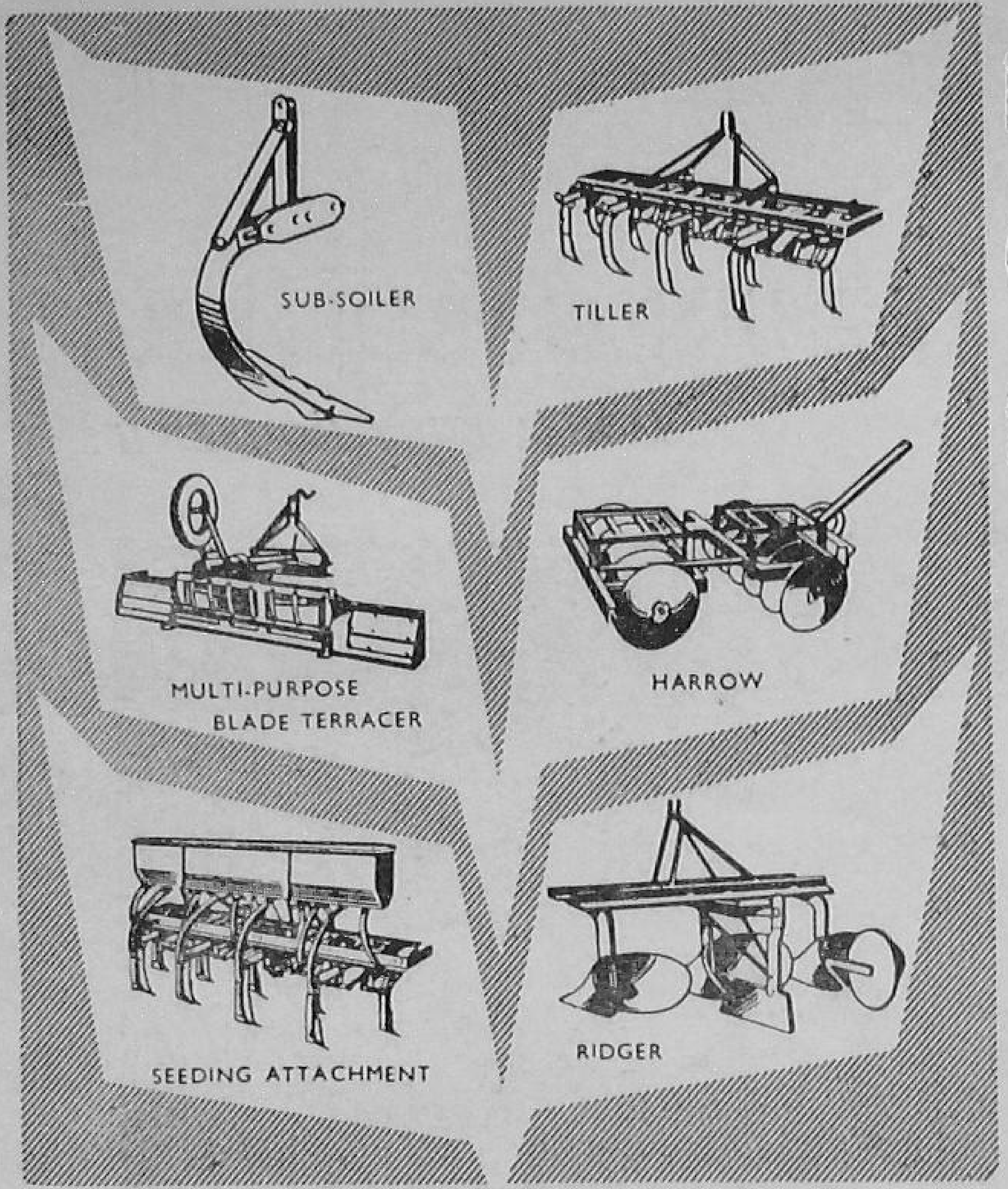
(Photographs Courtesy ICAR)

The breed derives its name from the blue waters of the Sutlej river. The animals are usually black in colour but some are brown also. Wall eyes, white markings on forehead, face, muzzle and legs and a white switch on the tail are the distinguished characteristics. The buffaloes of this breed are high milk-yielders.

SURTI

This breed is found in the Charottar tract and the adjoining territory in the Baroda region of Gujarat State. The best animals come from Nadiad, Anand and Borsad *taluks* of Kaira District.

The animals are usually black or brown, and good specimens have two white collars, one round the jaw and the other round the brisket. These buffaloes are economical producers of milk.



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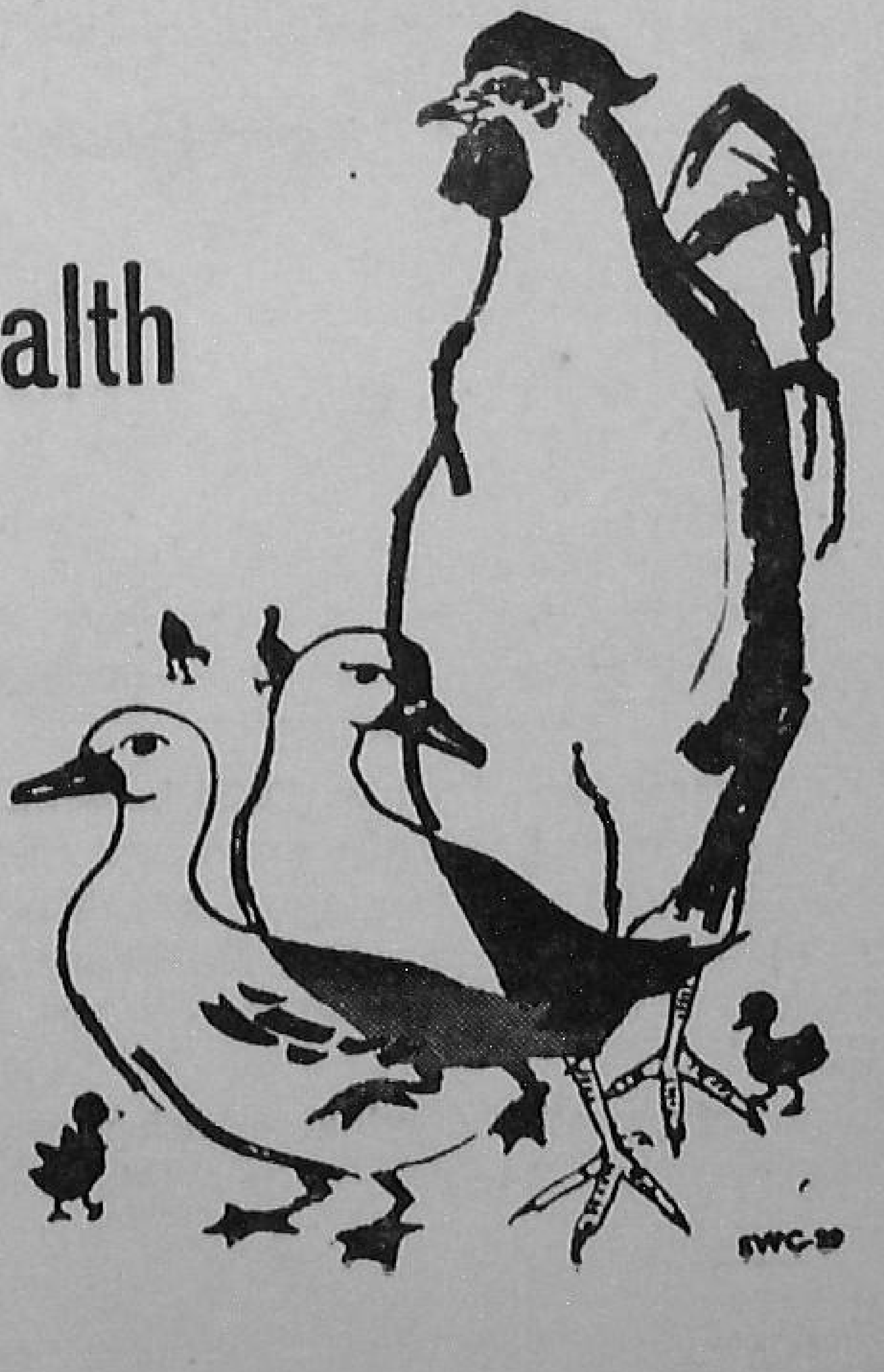


You too can be

A SUCCESSFUL KITCHEN GARDENER

SAYS A BUSY HOUSEWIFE

A rich crop of gourds in Mrs. Ramaswami's kitchen garden

By
M. E. MUNDKUR
Farm Information Unit
Directorate of Extension
New Delhi

YOU don't have to be an agricultural expert to start a kitchen garden. Knowledge of a few basic steps and of course, hard labour—plenty of it—are all that you need to raise a good kitchen garden.

This is the experience of a busy Delhi housewife—Mrs. Lalitha Ramaswami, wife of a government official. In a 100-square yard plot, they grow enough vegetables almost all the year to satisfy the six-member family's needs and with enough to spare every now and then for neighbours.

A visit to their small but well-kept kitchen garden amply proves all that.

There are rows of brinjals, bitter-gourds, lady's finger and cluster-beans. In the backyard, there are drumstick trees, bananas, carry-leaf trees and a grape-vine.

The four-year old grape-vine gave 200 bunches of juicy pink grapes this year.

Ramaswamis moved in their present house B-45, D-II in Moti Bagh, a government colony, four years back. The first thing they did was to dig up the whole plot and apply half cartload of urban compost.

Since then only kitchen refuse, dried leaves and dry cow-dung have gone as manure with a little of chemical fertilizers—superphosphate and ammonium sulphate.

The pink grape vine in Mrs. Ramaswami's garden

There is a fence around the ground to keep off the unwelcome visitors—stray cattle, etc.

The seeds came from the Government Vegetable Seed Depots.

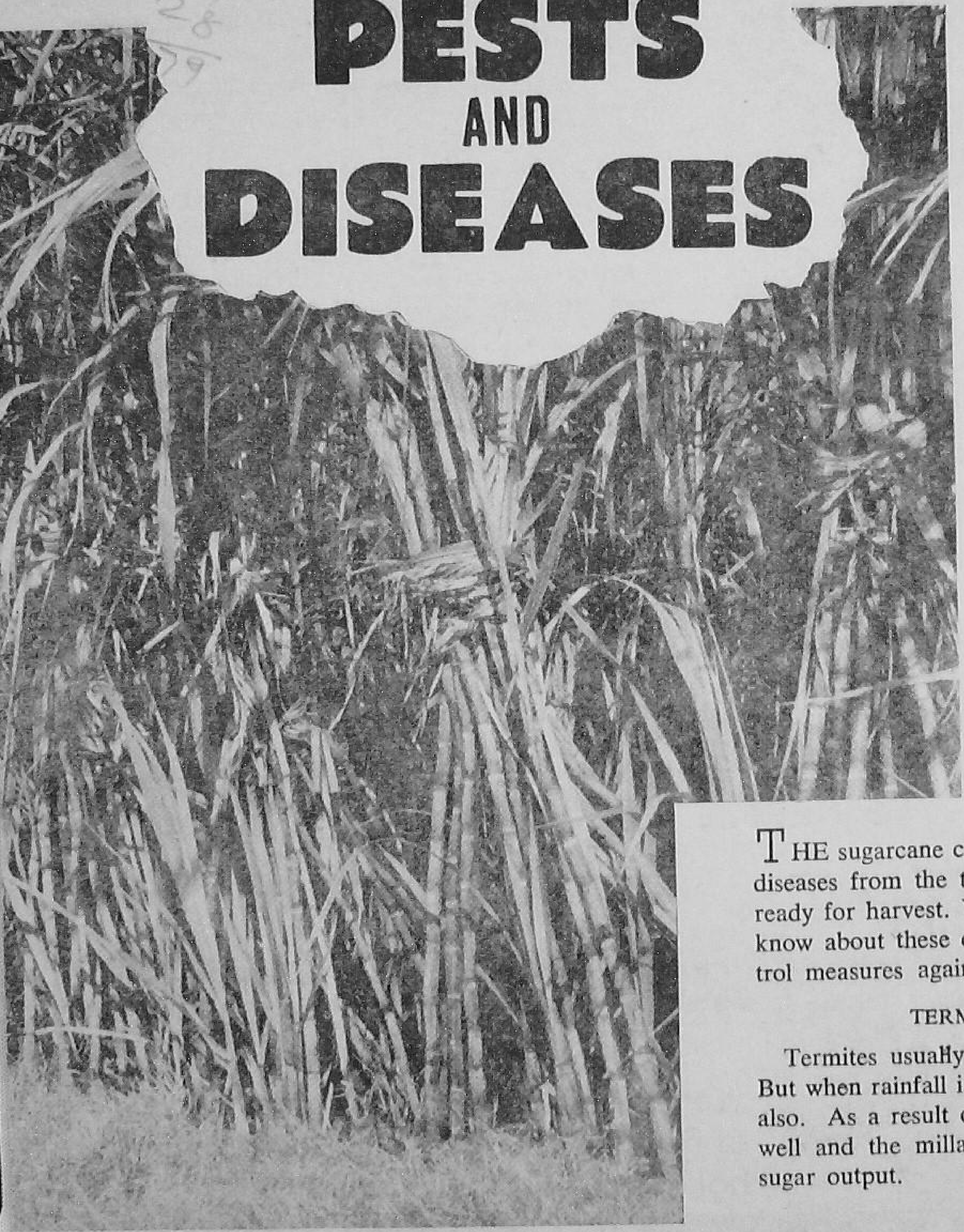
The whole family took turn to attend to various jobs—weeding, watering, pruning, sprinkling soap-water as an insecticide and last but not the least keeping a watchful eye for any intruder.

But vegetables are not all that grow luxuriantly in the Ramaswami's kitchen garden. In addition to fruits, bananas, grapes, guavas—there are flowers too. Roses and jasmins add colour and fragrance to the garden.

All these at a very little cost, and without any expert knowledge too. No wonder Mrs. Ramaswami has every reason to say that almost every one can be a good kitchen gardener.

What you should know and do about

SUGARCANE PESTS AND DISEASES



By
D. B. REDDY
Plant Protection Specialist
Directorate of Extension
New Delhi

THE sugarcane crop is attacked by many insects and diseases from the time it is planted to the time it is ready for harvest. You, as a sugarcane grower, should know about these cane enemies so that you take control measures against them well in time.

TERMITES (WHITE ANTS)

Termites usually attack the planted sugarcane setts. But when rainfall is low, they attack the millable canes also. As a result of the attack, setts do not germinate well and the millable canes give a low yield a poor sugar output.

BORERS

There are about half a dozen species of borers, caterpillars of moths, attacking sugarcane. These are the shoot borer, stalk borer, Gurdaspur borer, internode borer, top-shoot borer and root borer. Amongst these, the most important are the shoot borer and the top-

shoot borer, although the other borers are of regional or local importance.

If the sugarcane is attacked in early stages, 'dead hearts' are formed. Any attack later results in a inferior quality juice and a heavy loss of crop.

The shoot borer, the green borer and the root borer are very active during the hot season. The shoot borer is active from July to September, the stalk borer from September to November and Gurdaspur borer from July to September. However, these borers may attack the crop at any stage of growth.

PYRILLA

Pyrilla, both as an adult and a nymph, sucks the sap from the plant. The underside of leaves is infested and the attacked leaves lose turgidity and dry up. The pyrilla-attack starts early in the season but becomes intense with the monsoon and continues up to October. The attack is seen more prominently on the canes grown along the field bunds.

WHITE FLIES

The insects suck sap from leaves. When they are in large numbers, they damage the crop by attacking leaves which turn pale, affecting adversely the crop growth. The infested leaves get covered with black pupal cases.

Although the white flies may be found on the crop during the season, they are most active during September to November. They occur more commonly under water-logged conditions and on a crop grown in nitrogen-deficient soils. Its infestation is heavy in ratoon crops.

MEALY BUGS

The adults and nymphs remain in the leaf sheaths. They suck the sap and affect the growth of the plants and thereby reduce the yields.

These insects are found mostly on the ratoon crop and are active from April to November. In the case of a severe attack, canes shrink at the rind.

MITES

Reddish mites feed mostly on the underside of leaves, where they make silken-webs and cause brownish specks on the case. The severely-affected dry and drop off. Mites are active mostly during the hot weather from March to June.

Grasshoppers, armyworms, aphids, thrips and white grubs are the other insects pests that attack sugarcane and can cause damage if they are not checked and controlled in time.

RED ROT

The affected leaves dry up along the margins and drop off. The midribs of leaves develop elongated dark reddish areas which later turn into broad red spots with dark margins.

The badly-affected canes shrink and black specks appear on their rind; the specks are most conspicuous near the nodes. When an affected cane is split open, red blotches with transversely elongated white centres are seen.

SMUT

When the disease attacks, a long, black whip-like structure appears from the apex of the affected cane. The lateral buds sprout into shoots which also develop smut whips.

The diseased crop produces tall, thick spindly canes, and an excessive tillering takes place. The disease is more prevalent in hot dry regions and on the thin indigenous cane varieties. It is also found more in ratoon crop.

MOSAIC

It is a virus disease. The affected leaves show dark and light green patches which later becomes chlorotic. The symptoms are more prominent on young leaves, and are clearly seen when held against light. The yield of the diseased crop is reduced, and the juice quality is also affected.

OTHER DISEASES

The other diseases such as grassy shoot and twisted top (virus diseases), red stripe (bacterial disease), wilt, seedling disease, rust and leaf spot diseases (fungus diseases) are of minor importance but may become important in certain areas.

WEEDS

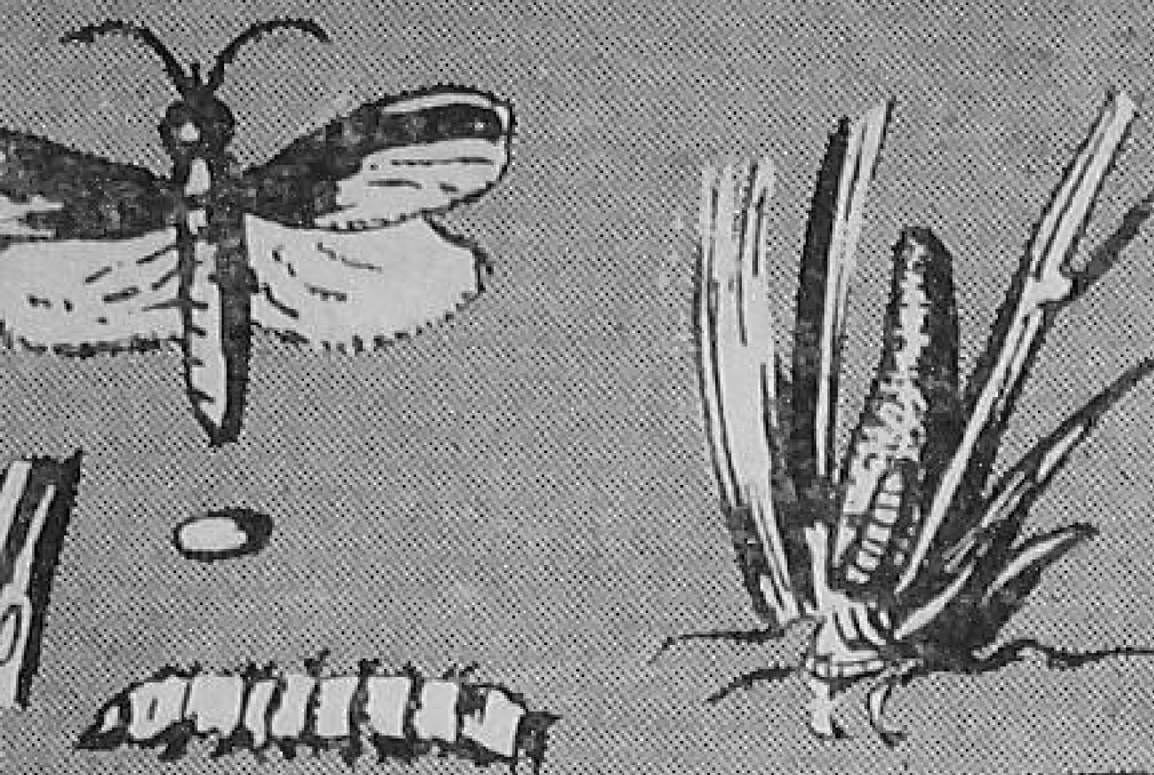
There are some important weeds which affect the growth and yield of sugarcane. Some of them are broad-leaved and some belong to the grass family. The most well-known is the *striga* which is a flowering parasite. Weeds suppress the crop growth and affect the yield considerably.

WHAT YOU SHOULD DO

TERMITES

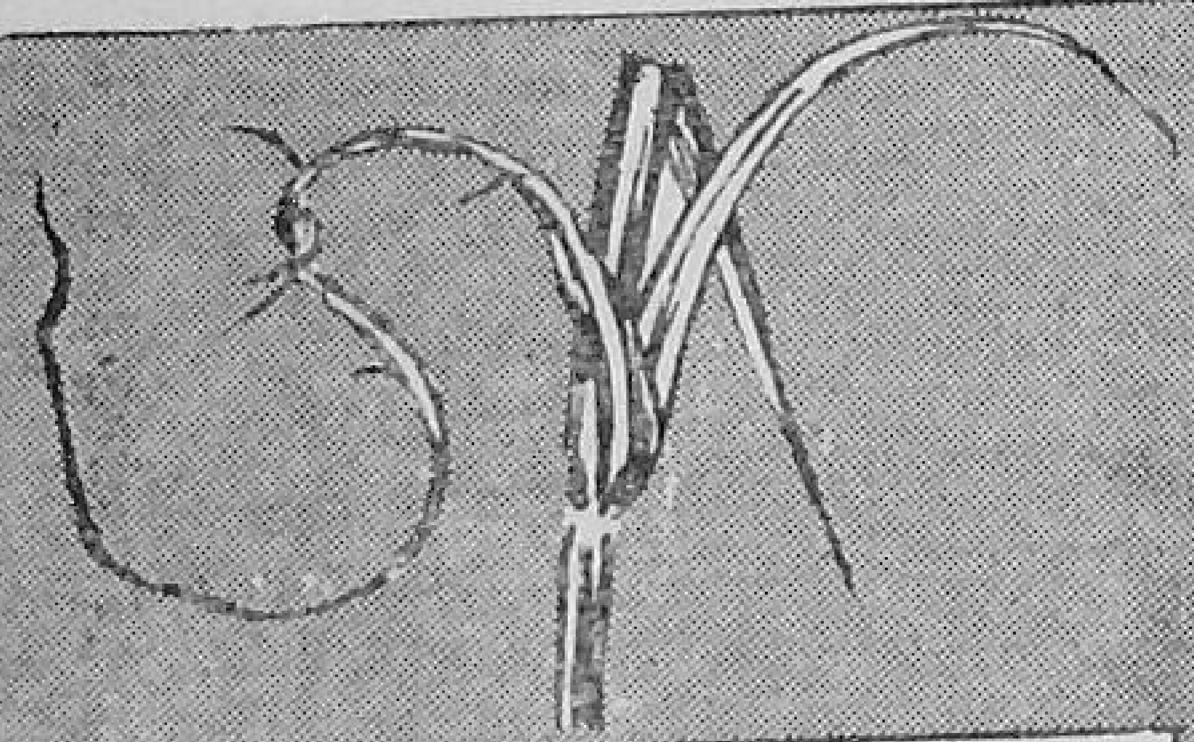
To prevent termite attack, dust 10 per cent BHC or 5 per cent Aldrin or Heptachlor or Chlordane at 9 to 18 kilogram per acre in the furrows at the time of planting the sugarcane setts.

When termites appear on the grown-up crops, irrigate frequently. Or you should drench the area



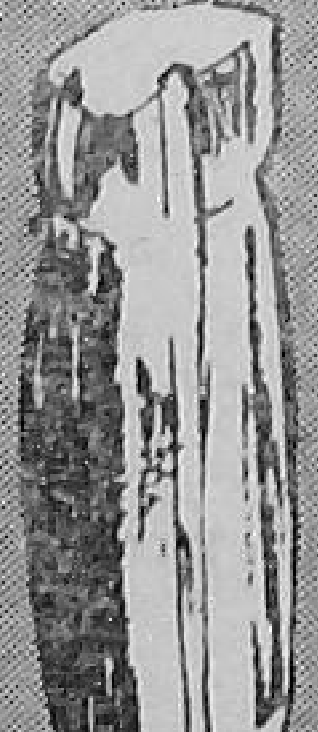
OOT BORER

(i) Plough up stubbles and burn.
ii) Avoid ratooning in infested fields.
ii) Spray 0.25% DDT, 0.32% BHC, or 0.1% Endrin (19.5% E.C.)



MUT

(i) Rogue out systematically the diseased plants.
(ii) Use disease-free seed material.
iii) Avoid ratooning of diseased crop.
iv) Grow resistant varieties.

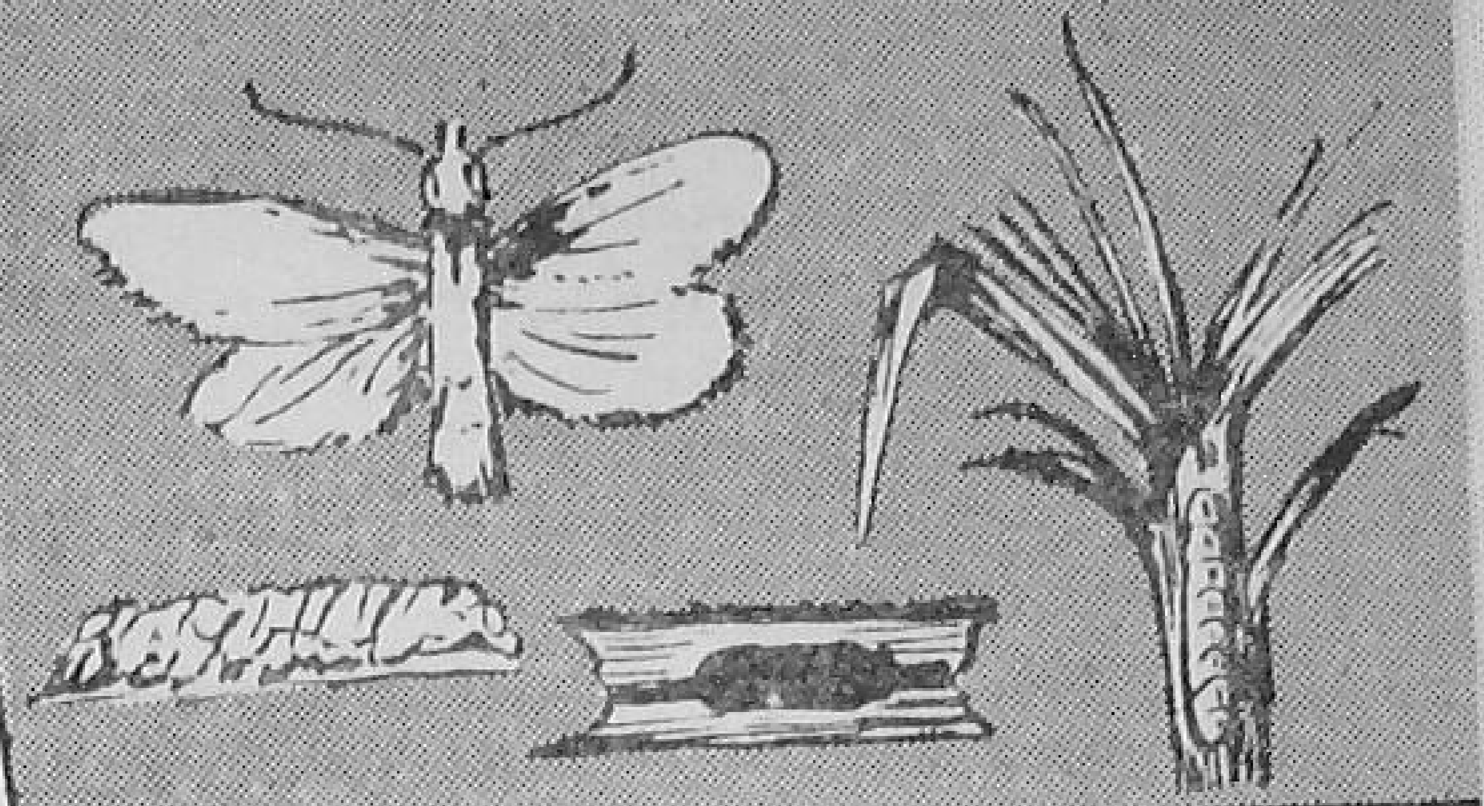


ED ROT

(i) Use disease-free seed material.
(ii) Avoid low-lying and ill-drained fields.
(iii) Destroy disease-affected clumps.
(iv) Follow a three-year rotation.
(v) Use resistant varieties.

CONT
PESTS AND
OF SUGA

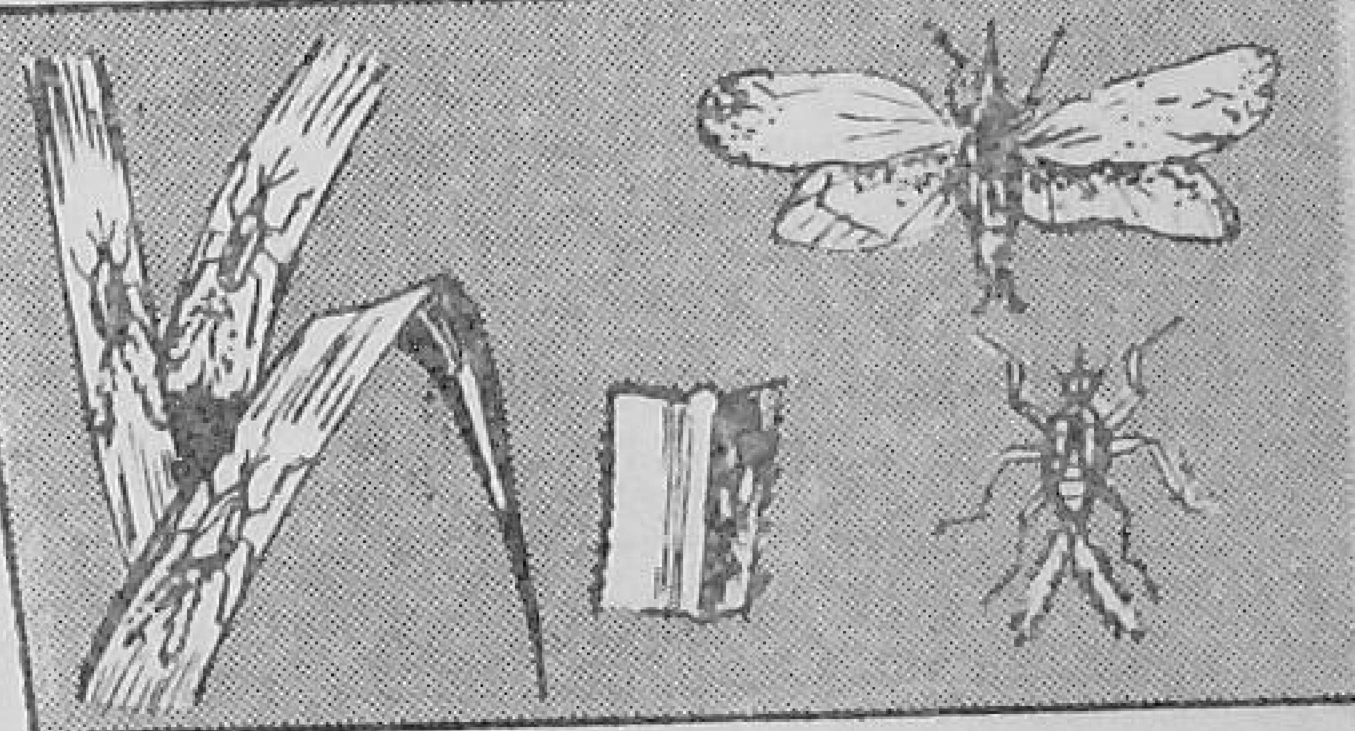
TROL
DISEASES
ARCANE



TOP BORER

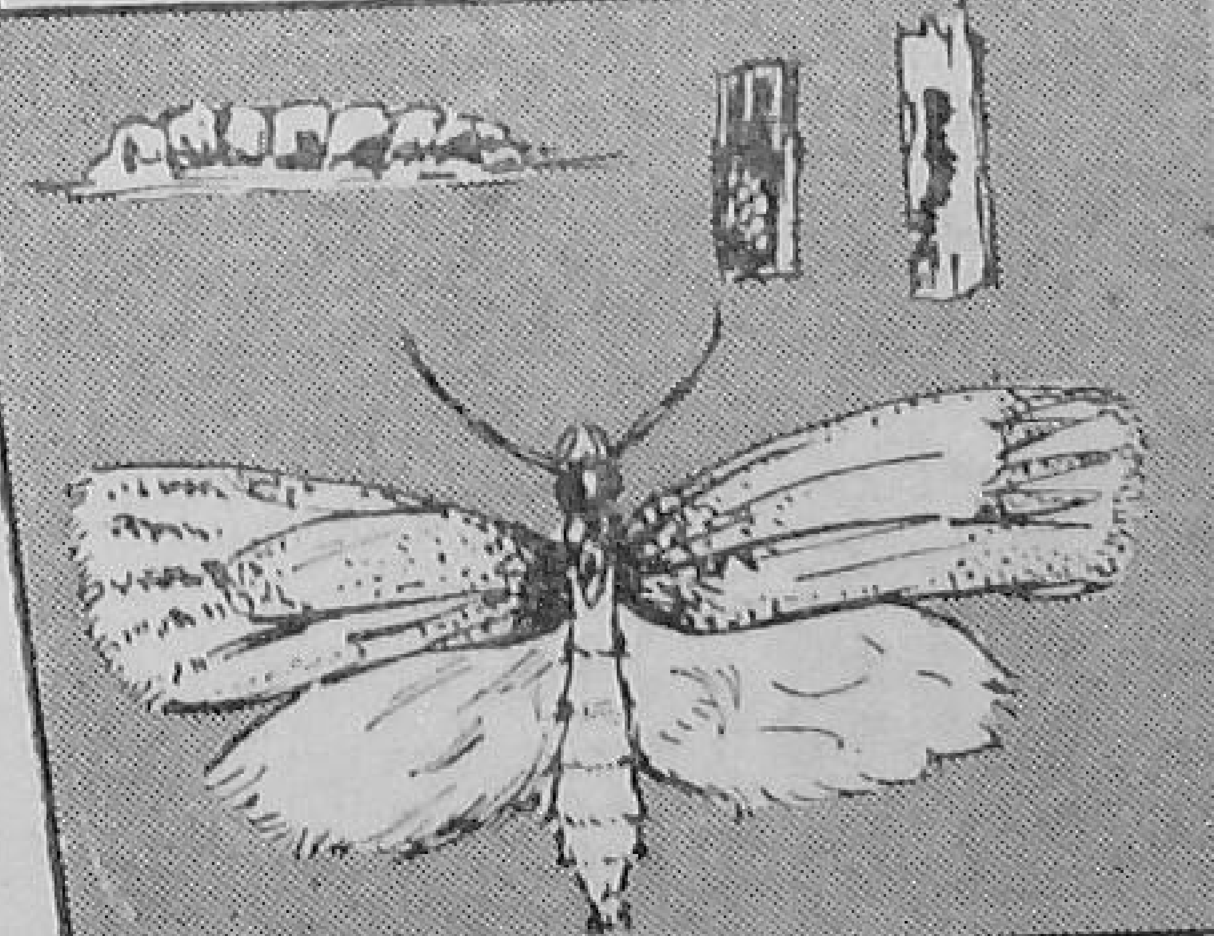
(i) Cut affected top shoots and destroy by burning.

(ii) Spray with 0.1% Endrin (19.5% E.C.) or 0.32% BHC.



PYRILLA

(i) Dust the crop with 5% BHC or spray with Endrin 0.1 pound actual material per acre or spray 0.25% BHC or DDT.



STEM BORER

(i) Earth up young crop and irrigate

(ii) Follow a regular schedule of spraying

(iii) Cut affected shoots and destroy by burning.

around the affected clumps with BHC or Heptachlor (20 per cent E.C.) at one litre in 300 litres of water at the rate of 675 litres per acre.

BORERS

The following measures will effectively reduce the attack of borers.

Burn trash and plough up the field, if not kept for ratooning, for destroying the stubbles. Remove the water shoots along with the millable canes.

Earth up lightly the young crop; follow it up with irrigation.

Remove 'dead hearts' and other dead or affected portions and burn to kill the larvae and pupae. Collect egg masses wherever possible and destroy.

Spray the crop with BHC or DDT (50 per cent wettable powder) at one kilogram in 150 litres of water or Endrin (20 per cent emulsifiable concentrate) at one litre in 200 litres to 660 litres of water, when the crop is about 2 months old. Spray again after an interval of 6 weeks or about a week after the moth have emerged or as necessary.

PYRILLA

Dust 10 per cent BHC or spray Endrin (20 per cent emulsifiable concentrate) at one litre in 2,000 litres of water.

If the pest is present at the time of insecticidal treatment against borers, no separate treatment for pyrilla is necessary.

Regular sprays keep pests away

WHITE FLIES

Spray BHC (50 per cent wettable powder) at one kilogram in 200 litres of water or Parathion (46 per cent to 50 per cent emulsifiable concentrate) at 50 mililitres in 100 litres of water or Malathion (50 per cent emulscifiable concentrate) at 100 mililitres in 100 litres of water.

MEALY BUGS

Spray Parathion or Malathion in the quantities used against the white flies.

MITES

Adopt the control measures suggested for mealy bugs or spray lime sulphur at one part in 30 parts of water or wettable sulphur at one kilogram in 360 to 400 litres of water, or dust sulphur or other acaricides, as recommended.

OTHER PESTS

You can control other insect pests like grasshoppers, etc., by dusting with 10 per cent BHC.

RED ROT

*Use healthy and disease-free setts.

*Do not plant in heavily infected fields.

*Make suitable bunds to avoid infection through irrigation or rain water flowing through the infected fields. Drain off the excess water.

*Avoid planting in low-lying and ill-drained areas.

*Use field-resistant or tolerant varieties. Consult your local Plant Protection or Agricultural Officer for suitable varieties for your area.

SMUT

*Use setts obtained from the disease-free fields.

*Rogue out systematically the diseased clumps. Inspect the crop fortnightly from the second or third month onwards. The smutted portion should be carefully collected in a cloth bag, immersed in boiling water for 15 minutes.

*Avoid ratooning.

*Use field-resistant or tolerant varieties. Consult the local Agricultural or Plant Protection Officer for advice on the suitable variety for your area.

MOSAIC

*Use setts obtained from a disease-free crop.

*Rogue out the affected plants, specially in the initial stages.

(See page 28)

TOBACCO

can be made to yield HIGHER

A few useful tips for Mysore tobacco growers which tobacco growers elsewhere also may find profitable.

THE soil determines the texture of the tobacco leaves. A medium to deep black soil up to a four-foot depth, well-drained and fertile, is suitable for growing tobacco for *bidi,* chewing and snuff purposes.

Light ash-coloured or reddish sandy soil or a sandy loam, shallow to medium in depth, rich in organic matter and well-drained, is good for growing cigarette, cigar wrapper and high quality pipe tobacco.

In short, the tobacco soil should be deep, uniform in texture, free from grit, gravel and stones, and well drained. The tobacco does not exhaust the soil.

CLIMATE

The climate gives flavour to the leaves. Tobacco can be grown in tropical, sub-tropical and temperate zones. In Mysore, it is grown at an altitude of 3,000

feet above sea level. The temperature during the growing period of the crop may vary from 60° to 100° F.

The rainfall should be moderate *i.e.* 20 to 40 inches and well distributed during the season. The crop cannot stand heavy rain or water. Rain after the formation of resin on the leaves in *bidi* tobacco washes away the resin and thereby reduces the quality.

Curing requires a bright sunny weather and a fair degree of humidity, so that the cured leaves do not dry into a brittle condition. At high temperatures, or with a low humidity, leaves become brittle and unfit for marketing.

To sum up, a moderate rainfall is required during growing season followed by a dry season with humidity not below 70°.

VARIETIES

Only two species, *Nicotiana tabacum* and *Nicotiana rustica* are of commercial importance in India. The former supplies all the tobacco for products like cigarette, *bidi*, chewing, cigar, cheroot, *hukah* and snuff. It covers 85 per cent of the tobacco area.

The *bidi* tobacco should have (1) reddish brown spots or spangles on the orange to light greenish brown leaf in the characteristic brown spots, (2) thick leaves but not coarse in texture, (3) granulation of the leaf or puckering, (4) strength or aroma, strong and agreeable smoke, and (5) nicotine content—3.13 to 3.90 per cent.

The local varieties of *bidi* tobacco are *Surti, Shendi Surti, Akkol Gund, Kare Gund,* etc. *S-20* is the recommended variety as it produces 15 to 20 per cent more yield per acre, develops more spangles on the leaf, fetches a premium of Rs. 5 per maund of 40 lbs. over the local types, brings an additional income of Rs. 100 per acre, and contains 4.5 to 5 per cent nicotine and 19 per cent ash.

S-20 is stronger but yields less than the Gujarat Strain. It requires a well-drained, medium black soil or a loamy soil with 30 to 35 inches of rainfall. It is late by a fortnight when compared to local varieties.

Plant your tobacco in lines for clean cultivation

A good cigarette tobacco should have bright orange colour, fine and silky texture, good body, no blemish, mild strength, even and continuous burning character, white ash, pleasing aroma, and nicotine content 0.69 to 2.96 per cent.

Here are some well-known varieties.

Harrison Special 9 for best yields, Virginia Gold or Super Gold—for both yield and quality, *White Burly*—silky in texture (can be air-dried), *Chataham*—maximum bright colour with high yields, and *Delcrest* which brings Rs. 300 more per acre with bright grades.

Local varieties like *Chauthikudi, Kumkumadri,* etc. are in demand largely for internal use. They are comparatively lighter with a pleasing aroma and a medium strength. They are used generally in the manufacture of low-priced cigarettes.

NURSERY

Select a site for the nursery on an elevated place, free from stagnation of water during the rains. It should be near a water source to facilitate watering if there is no sufficient rain in time. Change the site every year in order to avoid insect pests (stem borer, root knot, etc.) or diseases in the nursery.

Mark the nursery site at 4 feet x 4 feet with a 2-foot space in between for walking and proper drainage; there will be 25 such beds in a guntha (2.5 cents).

Dig the bed to a depth of not less than 9 inches; remove stones and roots. See that the soil is turned to a fine tilth, as fine as sand.

Add four baskets (80 pounds) of well-rotten and sieved farmyard manure with two to four ounces of superphosphate per bed. Mix thoroughly with the soil.

Apply Bordeaux mixture (2 : 2 : 50) at one gallon per bed to prevent 'Damping off' disease. Also spread one spoonful of Aldrex 5 per cent powder, mixed with saw-dust and sand, evenly on the surface of the bed. This will prevent cutworms and any other ground pest attacking the young and delicate seedlings.

Protect the sides of the beds against corrosion in heavy rains or by careless watering, with *jowar* or tobacco stalks.

You can also use powdered tobacco stalks, 40 pounds per bed, in place of farmyard manure. It will result in a better germination and healthy seedings.

Instead of farmyard manure, you can also use castor oil cake or any other bitter cake, two pounds per bed, when easily available.

Rabbing of seed bed should be done whenever possible. It consists of burning rubbish (about 20 lb) on each bed and mixing the ash with the soil. The heat absorbed in the soil kills soil germs and diseases.

SEED TREATMENT AND SOWING

Treat seeds with Agrosan powder, Ceresan solution, or silver nitrate solution (0.1 per cent) for 10 minutes to prevent 'Damping off' disease. Mix the seeds with sieved wood-ash or fine soil and rub them with sand or soak them in water for three to six days to soften their coating and hasten the germination.

Use one to two grams (1 gram contains 10,000 seeds) per bed. Two such beds can provide sufficient material to plant an acre. Sow in the last week of June or the beginning of July, thinly and uniformly by hand.

Mix the seed in the bed by stirring. Press the bed slightly and uniformly to make it even. Cover it with paddy straw, dry leaves or a mat for four days.

AFTERCARE OF NURSERY

The seeds begin to germinate from the fifth day after sowing. Remove the top cover of the seed-beds on the fourth night.

Water regularly by means of *jari* only, not less than twice a day if there is no rain. Also spray Bordeaux mixture (2 : 2 : 50) or Perenox or Phytolon or Blitox (4 ounces in 10 gallons of water) at one gallon per bed for protecting seedlings against 'Damping off' disease. Pull out weeds regularly.

The seedlings make rather a slow growth in the beginning. But once the leaves come up well above the ground, the growth is quick. In about 40 days, the seedlings grow to a height of five to seven inches with four to five leaves. They are then fit for transplanting.

After three weeks, if you find the seedlings pale and weak, give a dose of solution of sulphate of ammonia (1 pound in 20 gallons of water) at one gallon per bed. Follow it up with a heavy drenching of the seedlings by water to avoid scorching and the death of tender seedlings because of deposit of the chemical. You can repeat the treatment, if necessary, eight to ten days after the first application.

One acre of land accommodates 1,000 beds of four feet by four feet with a two-foot spacing in-between. Each bed supplies not less than 2,000 seedlings. At the Government rate of Rs. 2 per 1,000 seedlings, the income per bed will be Rs. 4 or Rs. 4,000 per acre while the total expenditure does not exceed Rs. 1,000, leaving a net profit of Rs. 3,000.

Mix honge oil cake with irrigation water

PREPARING THE LAND FOR PLANTING

Plough nine to ten inches deep once every three to five years. Give a shallow ploughing of five to six inches every year with a turnwrest plough not later than February or early March. See that the clods are well pulverized and reduced to a fine tilth and exposed to sun till rains start.

Apply 25 to 30 cartloads of well-rotten farmyard manure or compost with 2 cwt. of superphosphate per acre. For irrigated tobacco *bidi,* you can give 35 to 40 cartloads of farmyard manure.

GREEN MANURING

If you are green manuring the field, you need 5 to 10 cartloads of farmyard manure or compost with 2 cwts. of superphosphate.

Apply 40 pounds of sannhemp seed or 30 to 35 pounds of *udid* seeds per acre in the last week of May or early June. Sannhemp is better wherever the rain is scanty. Plough in green materials into the soil after 45 to 50 days or by the middle of July.

PLANTING

The best time for planting is the first fortnight of August. You can continue till the middle of September. The green-manured land will be ready a bit later, *i.e.,* by the first week of September.

Plant good and healthy tobacco seedlings, five to six weeks old, with only one seedling in each pit. An acre of land takes 3,550 seedlings. If the seedlings are to be exposed for more than six hours without planting, spray them with six to eight per cent sugar solution to increase their resistance to exposure.

AFTERCARE

Replace immediately the seedlings attacked by cutworms. After the seedlings establish themselves, take

YOUR DUTY NOW — PRODUCE MORE

up interculturing with a blade hoe. Hand-weed and stir once a week around each plant.

Top-dress with 20 pounds of nitrogen in the form of a mixture consisting of groundnut cake (10 lb N) and sulphate of ammonia (10 lb N) for green-manured lands. Give 40 pounds N in the same proportion to the land which is not green manured.

Place the mixture two to three inches deep around the plant after three weeks of planting. Apply the second dose three to four weeks after the first one for *bidi* tobacco.

In the case of cigarette tobacco, in addition to a basal dose of 5 cartloads of farmyard manure or compost per acre, give the following manure mixture: 100 lb. of groundnut cake plus 60 lb. of sulphate of ammonia plus 150 lb of superphosphate plus 60 lb of sulphate of potash. Cigarette tobacco under irrigation may be given honge oil cake (1/2 ton per acre) which is stirred in the irrigation water.

TRIMMING

Provide a clean space of about five inches between the last leaf of the tobacco plant and the ground level, removing the bottom leaves (sand leaves) as they come up.

TOPPING

After six to seven weeks of planting, nip off or 'top' the main growing shoot of each tobacco plant (*bidi* tobacco only), leaving 12 good leaves. This increases the size of each plant and improves the thickness of the leaves. No such topping is practised in cigarette tobacco. In some cigarette varieties, topping is done at the time of flowering for increasing the size of the top leaves.

SUCKERING

As a result of topping, the shoots called 'suckers' begin to grow quickly and vigorously from the leaf axils and from the bottom. Remove these at the time of weeding or mulching once a week.

Spray regularly to keep away "Damping off" disease

After five to six weeks of planting, give a preventive spray with Metasystox, Ekatin (1 oz in 10 gals), Folidol (1/2 oz in 8 gals) or Endrin 20 EC (1 oz in 13 gals). Repeat it once or twice.

Also do not forget to earth up cigarette tobacco 1½ months after planting.

HARVESTING

After 3½ to 4½ months of planting, the plants are ready for harvest. All the leaves do not ripe at the same time. Therefore, pick ripe leaves at intervals.

YOUR GOAL

BETTER AND STILL BETTER

YIELDS

Generally no ratooning is taken. Sometimes the ratoon crop is taken from the stubbles left in the field which are harvested by the end of May and sold separately. These are sold at a very low price and are used for mixing with *jardi*.

YIELD

The *bidi* tobacco crop yields 600 to 800 pounds per acre while cigarette tobacco crop produces more than 1,000 pounds. The irrigated crop will yield from 1,500 to 2,500 pounds per acre. The cost of cultivation varies from Rs. 250 to Rs. 400 per acre.

PESTS AND DISEASES OF TOBACCO CROP

The tobacco aphid

It is the worst pest on *bidi* tobacco in Belgaum District. The aphid attacks the leaves of the growing plants, which become twisted, curly, unshapely and ill-developed and then gradually fade. The infested crop is unfit for curing.

The underside of the leaves is covered with myriads of these insects. They secrete a sugary juice, called 'Honey Dew' which attracts ants and also by whose presence a "black mould" develops which is generally known as 'Sooty Mould'. The presence of this mould in the tobacco leaf makes it unfit for curing.

Remove the badly affected leaves and burn them with any of the following :

Metasytox—1 oz in eight to ten gallons of water.
Ekatin—1 oz in seven to eight gallons of water.
Folidol—1/2 oz in eight gallons of water.
Endrine—1-2 ozs in ten gallons of water.
Sayfes—2.5 grams in one gallon of water.

Stem Borer

It is a serious pest of tobacco. It attacks seedlings in the nursery and the young plants in the field. The growing shoot is destroyed and the plant then begins to throw out small shoots or leaves. This puts back the growth and gives rise to a bushy development which is of no use.

When the grubs emerge from the eggs on leaf sheaths or mid-rib, they crawl down into the axil and then into the stem, eating and burrowing into the tissue. The stem shows swelling at the spot which is a sure sign of tracing the grub. An unusual branching of the seedlings and a stunted growth are the result of the attack. It is difficult to control the pest as the grub is hidden inside he stem.

To control, make a small slit into the swelling, extract the grub and kill it.

Spray Endrin 20 EC (0.01 per cent) *i.e.*, 3.2 ounces in 40 gallons of water on the plants.

Spray Folidol—1 ounce in 10 gallons of water—on the plants every 15 days up to the topping stage.

If the nursery seedlings are affected, dip them in a solution of calcium arsenate (2 lb in 100 gals) before planting them. Do not use suspected seedlings.

Cover the beds in the nursery with a thin cloth to prevent laying of eggs by the moths.

Cutworm

This is a very troublesome pest for newly-planted seedlings in neglected fields.

Spray Dieldrine 1.25 lbs. in 100 gallons of water.

Dust Aldrine 5 per cent.

Spray Endrine 1-3 ozs in 10 gallons.

Root Knot Nematode

This is also a troublesome pest in neglected fields. Minute worms known as eelworms are found in the soil. Plants get stunted or turn yellow or wilt, causing the death of the plants.

Keep the infested field fallow, changing the site every year.

Rotate with a resistant crop like chillies, gingelley or groundnut.

Cowpeas and tomato crops are very susceptible.

While planting discard seedlings attacked by nematodes.

Fumigate the seed-beds with ethylene bromide.

Ground beetles

The beetles, dirty grey black in colour, are found under heaps of rubbish or inside the bark of trees where there is shade and moisture.

They attack the newly-planted seedlings.

Spray Dieldrine 1.25 in 100 gals.

Dust Chlordane powder 5 per cent.

Dust Grammexane 5 per cent with sand (1 : 8) round the plants at the rate of 10 lb per acre.

Leaf-eating caterpiller

It causes considerable damage in some years. It attacks the plants both in the nursery and the fields eating up the green matter of the leaves first and later defoliating the plant seriously.

Spray with lead arsenate 2 to 3 lb in 100 gals.

Dust the plants with 5 per cent D.D.T.

Spray with Folidol 1 oz in 16 gallons of water.

Cigar beetle

It feeds on the cured tobacco leaves in storage. It is seen rolled in tobacco dust. It attacks all type of tobacco.

To control the pest, spray or fumigation is found most effective.

Grasshoppers

They attack seedlings, cut stems and eat leaves as a result of which the plant dies.

To control the pest, maintain clean cultivation.

Use poisonous bait of lead arsenate and rice bran (2 : 70). The bait should not touch the leaves and should be scattered round about the nursery.

Dust 5 per cent B.H.C.

Damping off

It is soil-inhibiting fungi, appearing in any stage of the tobacco plant. A sudden and complete collapse is the characteristic symptom of this disease. Affected seedlings show small construction on the stem just above ground level.

It attacks mostly in the nursery. Seedlings disappear due to rotting. Older ones shrivel, rot and show brown discolouration and ultimately collapse.

High humidity, cloudy weather, thick population, clayey soil and particularly rotten manure help the spread of the disease.

To control, don't raise seedlings in low-lying areas.

Rab the seed-bed.

Spray Bordeaux mixture (2 : 2 : 50) or any copper compound, sow thinly, avoid heavy watering which causes dampness. Use well-decomposed farmyard manure. Provide good drainage.

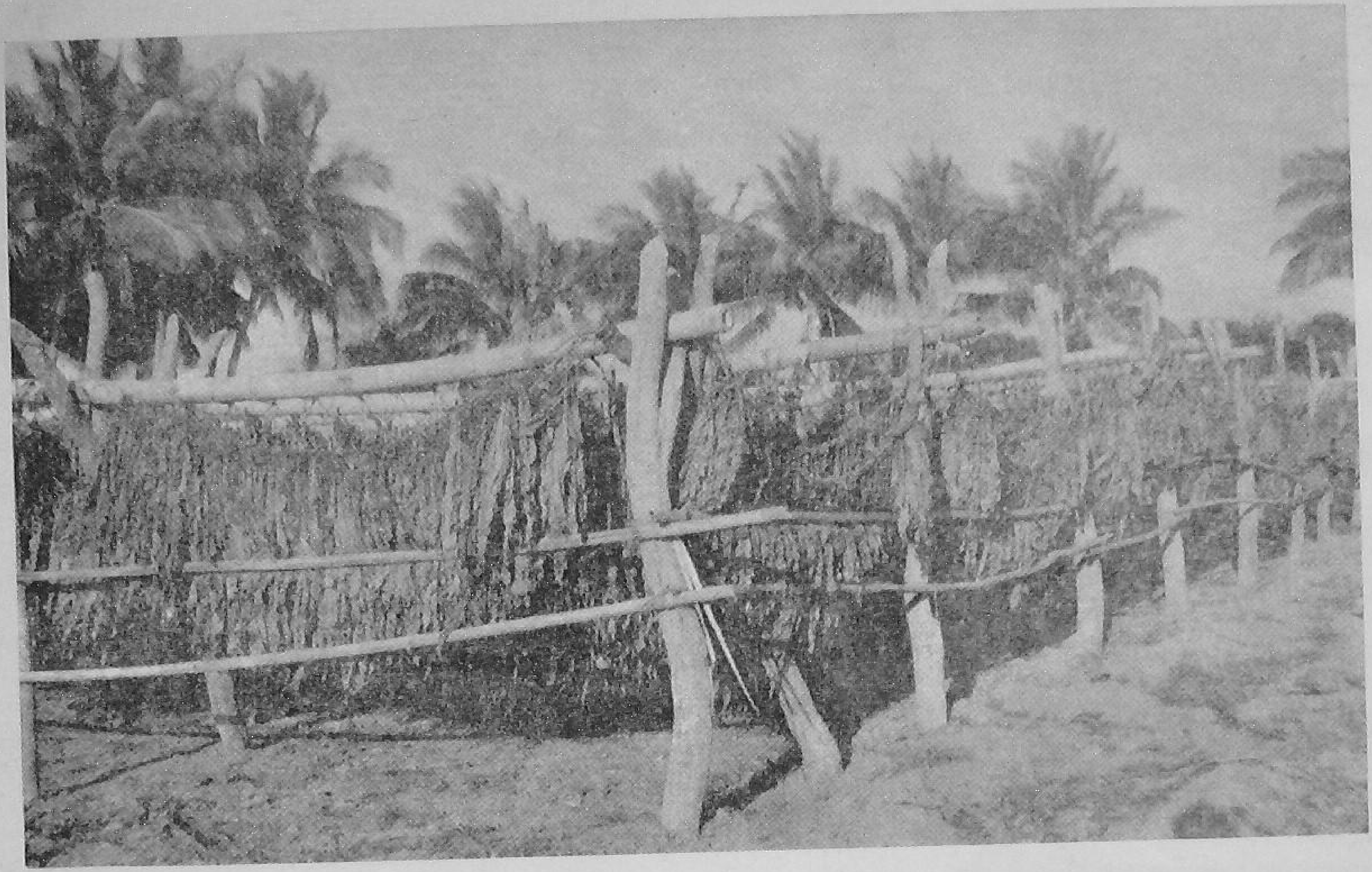
Collect the infected seedlings and burn them.

Orabanchee

Orobanchee or 'bambaku' is the most troublesome parasite of tobacco plant. It is a small plant parasite. The flower stalks almost white in colour spring close to the tobacco plant.

IN THE FIELD OR HOME-YARD

GROW MORE VEGETABLES



Tobacco plants kept in the sun for drying

The affected plant becomes weak, ceases to develop large leaves, remains stunted, causes great damage to the crop by sucking sap from their roots.

The seeds of bambaku are extremely small. One gram of tobacco contains 10,000 seeds while that of bambaku is 1,84,000 seeds. The seeds of *bambaku* drop down in the field long before tobacco is harvested, giving rise to the next year's growth of parasites.

To control, treat with Allyl Clchol (A.A. Shell) in 1 : 1000 (10 C.C. per gallon of water). It shows sure toxic effect resulting in the collapse of the seedlings in 48 hours.

Dig out the plants before the seedling stage and burn them.

No infection is noticed when tobacco is rotated with chilly, gingelley, groundnut or left fallow.

Tobacco has many other uses—as nicotine sulphate against the sucking insects. Tobacco seed contains 35 to 37 per cent oil, fit for use as an edible oil, also useful in the manufacture of soap and rubber. Tobacco-cake is a good manure.

THE FARMER'S FRONT—HIS FIELD

Don't let your aman lands remain idle

TAKE TWO OR EVEN THREE CROPS INSTEAD OF ONE

By
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Excepting for four to six months, most of aman *paddy lands in West Bengal remain idle all through the year. This need not be so any more.*

THERE are two ways West Bengal *aman* paddy growers can best utilize their lands.

One: To give up altogether the *aman* paddy and instead grow *aus* paddy or jute and follow it up with wheat, potato, pulses, oilseeds, etc.

Two: To take two or three crops with *aman* in rotation.

Farmers in West Bengal have been very much used to the growing of *aman* paddy. But they can grow a short-duration crop like jute before transplanting *aman* paddy. And jute does not adversely affect the *aman* paddy yields so long the paddy is transplanted in time.

JUTE AS THE FIRST CROP

Jute is the most suitable crop to fit in the double-cropping programme for many reasons.

Gives good returns

Jute, unlike the grain crops, gives quite good returns, even when harvested at a pre-mature stage. But a minimum of 90 days is necessary to get an economic return. You can give jute this much time only if you see that you are not late with paddy.

Therefore, adjust the jute sowing in such a way that it may be harvested in time. For example, in North Bengal, you can sow much earlier than the usual *kharif* sowing time, *i.e.*, in March-April. This will give jute enough time to grow up—four or four and a half months—and give high returns. Where irrigation is assured, you can give sufficient time for growing. You can also sow in rainfed areas, especially in low lands where the soils generally hold moisture, or with the pre-monsoon showers.

A crop insurance

Jute before *aman* paddy also serves as a sort of crop insurance when you cannot puddle the field for paddy in time due to a delayed or limited rainfall. In some years, even late transplantation is not possible and the land remains vacant.

In such cases, jute assures an adequate return even when paddy fails altogether, or the earnings from the long-duration jute amply compensate for the lower yields obtained from the late-transplanted *aman*.

Gives good manure

There is yet another advantage of growing jute before paddy—it provides organic matter for your next crop.

Jute plants shed a large amount of leaves when in the field. When they are harvested and stacked in the field for three or four days, they shed off almost all the leaves. The leaves alone contain 40 to 60 per cent of nitrogen removed by jute plants from the soil. Hence that much nitrogen is returned to the field through leaves.

If you compost the matter collected during weeding and thinning the jute crop, and apply that to the soil, you can further help the soil get back the fertility taken away by jute plants.

All this will benefit the crop following jute. If you add 20 pounds of nitrogen, the *aman* yield can go up even further.

Other advantages too

There are other advantages too. Preparation and puddling of the land where jute has been grown previously become easier and quicker. Actually you need give about half the preparatory tillage as compared to when jute does not precede paddy.

In the double-cropping programme, you harvest the jute when there is plenty of retting water, and also a higher temperature. This means quicker retting and a better-quality fibre.

Normally, excepting in northern areas of the State, jute is harvested rather late—in September-October and even November. In those months, very often, there is a dearth of retting water and the temperature falls. With a lower temperature, the retting is extended even to about 30 days or more.

RAISE JUTE THIS WAY

However, in this double-cropping programme the jute has to be harvested at a somewhat earlier stage. This results in low yields of fibre as compared to those from the normal full-grown crop. Therefore, see to it that you keep the cost of cultivation at the minimum. For that, grow jute this way.

Prepare the land well. *Aman* lands usually have a heavier texture, and are puddled. It becomes difficult to prepare good seed-beds for jute in such lands, specially for drill-sowing, which calls for a more thorough land preparation.

Therefore in most places, excepting in the light-texture soils of North Bengal, and parts of Nadia and Murshidabad districts, jute is sown broadcast.

Apply 50 to 100 maunds of farmyard manure while preparing the land and 20 lbs. of nitrogen with the last tillage operation before sowing.

Sow only *capsularies* variety and not *olitorious* for it can stand well drought as well as water-logging.

Fifteen to twenty days after germination, give a light harrowing with a *bida*. If used properly, it helps in weeding and thinning the jute plants and stirring the soil in the early stage of crop growth at a very low or nominal cost. You may have to use *bida* thrice.

After about 1½ to 2 months, give a hand-weeding and thin out the plants. But avoid any injury to the plants. Weeding and thinning operations in jute are very important.

Normally, jute plants are thinned heavily in 2 to 3 instalments so that only 20 to 30 per cent of the plant population remains in the field. In double-cropping, however, give only one heavy weeding to keep down the cost.

No further cultural operation will be required before harvesting of the jute crop. But if the weed growth is heavy and the jute stand poor, give a second weeding and thinning.

Harvest the jute crop with a sickle, close to the ground 5 to 7 days before transplanting paddy. Stack the plants and keep them on the land for 3 to 4 days for shedding of leaves. Prepare the land for *aman* paddy. Transplant the seedlings in time. An earlier transplantation of *aman* usually ensures higher yields.

CROPPING PATTERN

The exact cropping pattern and location of crops in the rotation will vary from region to region, depending upon the distribution of rainfall, soil moisture, retentive capacity of soil and irrigation facilities available.

Here are a few crop patterns. Consult your Gram Sevak for the correct rotation you should follow in your area.

1st crop Jute		2nd crop *aman*	3rd crop Gram/Wheat/Khesari
Sowing	Harvesting	Transplanting/Harvesting	Sowing
28th Feb. (120–day crop)	30th June	7th July Nov.–Dec.	Nov.–Dec.
30th March (120–day crop)	30th July	7th Aug.	,,
15th April (105–day crop)	30th July	7th Aug. ,,	,,
30th April (90–day crop)	30th July	7th Aug. ,,	,,
15th May (90–day crop)	15th Aug.	22nd Aug. ,,	,,

YIELDS FROM THE JUTE CROP

(a) The 90-day old jute crop: 9 to 13 mds. per acre

(b) The 105-day old jute crop: 12 to 15 mds. per acre

(c) The 120-day old jute crop: 15 to 20 mds. per acre

Yields of paddy, following jute, are not necessarily lower and the reduction, if any, is not likely to exceed 2 or 3 mds. per acre. This can easily be made up by applying fertilizers to paddy crop.

Let West Bengal farmers no more keep their *aman* lands idle when they can grow two or even three crops instead of one.

GROWING PEAS?

By P. N. GODBOLE
Farm Advisory Unit, Directorate of Extension, New Delhi.

For every rupee you spend on phosphatic fertilizer for a peas crop, you get an additional yield worth no less than three rupees

PEAS like most other leguminous crops, respond well to the application of phosphatic fertilizers.

Several demonstrations conducted in Uttar Pradesh during the last two years have proved this point. The variety used in all the demonstrations was—*Type 163*—the most popular of the field peas in U.P. and known for its high yielding ability and superior quality.

The crop gave an additional yield of 75 to 443 kilograms when 20 kilograms of phosphoric acid and 5 kilograms of nitrogen were applied per acre. In terms of fertilizers, these amount to 125 kilograms of superphosphate and 25 kilograms of ammonium sulphate per acre.

The yields in the demonstrations varied from 664 kilograms (18 maunds) to 1,143 kilograms (31 maunds) per acre with the use of nitrogenous and phosphatic fertilizers in the quantities mentioned above.

That the peas respond very profitably to the fertilizer is the experience of Samaipur village (in Delhi) also. In the experiments conducted here on garden peas, grown for vegetable purposes, the income per acre jumped from Rs. 461 to Rs. 682 with the use of 100 kilograms of superphosphate costing just Rs. 19.

Hence, if you want your pea-crop to yield well :

*apply 100 to 200 kilograms of superphosphate in furrows with the last ploughing, before sowing;

*select an improved variety like *T 163*, a popular field variety, or Pusa Bonneville, a favourite table variety;

*sow by the end of September to early November and not later than the end of November.

SESBANIA

By
RAVI VARMA
District Agri. Information Officer
(Package Programme)
Palghat

To grow it, you need spend only a little amount. But look at the quantity of green manure it gives—over a ton an acre.

THIS is *Sesbania*. It is fast becoming popular in the paddy region of Palghat District of Kerala.

Like to try it? Then here is how you should begin.

Where paddy is transplanted, raise seedlings of *sesbania* at the time the paddy nursery is sown. Just four ounces of seed sown in a ten-cent area will give enough seedlings to plant out field-bunds around an acre.

Prepare seed-beds 20 feet long and 10 feet broad. Give a sprinkling of compost mixed with ash. Sow seeds evenly, and cover with soil. Give an occasional watering and weeding.

In six weeks, when the monsoon breaks out, start transplanting paddy. Pull out *sesbania* seedlings also and plant them a foot apart in the inner side of the field bunds.

Standing water in the field does not affect *sesbania*.

In places where the first crop of paddy is broadcast dry, grow *sesbania* a little differently. Before the last ploughing, dibble the seeds on the borders of the field. The last ploughing covers the seeds. The pre-monsoon showers wet the soil and help the seeds sprout. The growth of seedlings in summer will be slow, but as rain starts they grow with double vigour.

PURE CROP

If irrigation is possible, it will pay you more to grow *sesbania* as a pure crop during summer in harvested paddy fields. For that, plough the field twice in January-February. Sow *sesbania* seeds 25 kilos to an acre. Cover them by giving another ploughing. Let in water immediately after sowing. Go on giving irrigations every fortnight till summer is over.

A pure crop of *sesbania* gives per acre about 30,000 pounds of green manure—enough for 5 acres.

SEED COLLECTION

Plants left to grow for themselves will easily set seeds. When the pods are ripe, collect them and dry in the sun.

This is all there is to it.

No wonder, this green manure so easy to grow and so rewarding in returns, is getting so popular.

CANE ENEMIES

(*From page* 16)

*Use mosaic-resistant or tolerant varieties. Consult the local Plant Protection or Agricultural Officer for the suitable varieties.

LEAF SPOT

You can control the leaf spot disease by spraying with Bordeaux mixture or other copper fungicides or organic fungicides.

STRIGA AND OTHER WEEDS

*Clean cultivation, pulling out the weeds at early stages and hoeing reduce the incidence of the weeds considerably.

*Spray 2, 4-D (80 per cent active material) at the rate of 450 to 600 grammes in 450 litres of water. You can also use other herbicides like MCPA.

RATE OF APPLICATION

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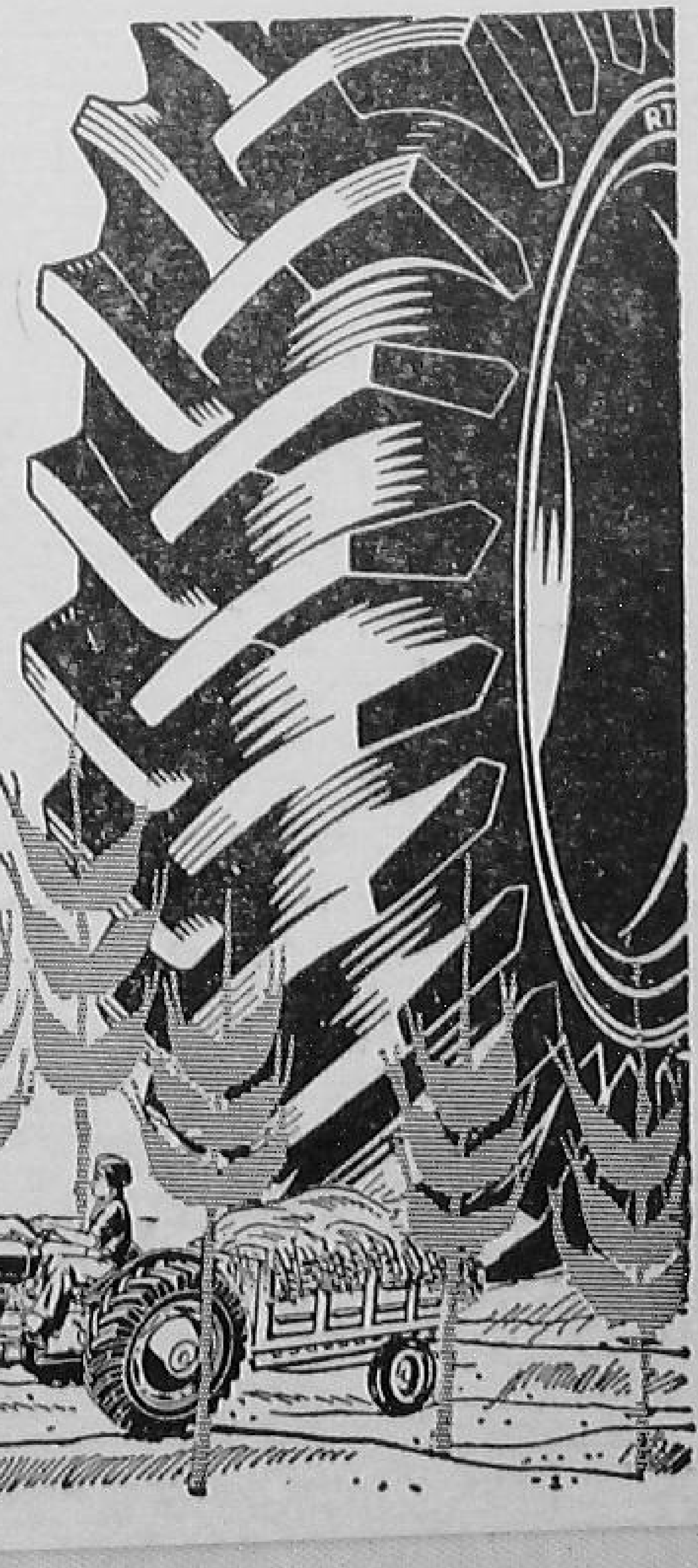

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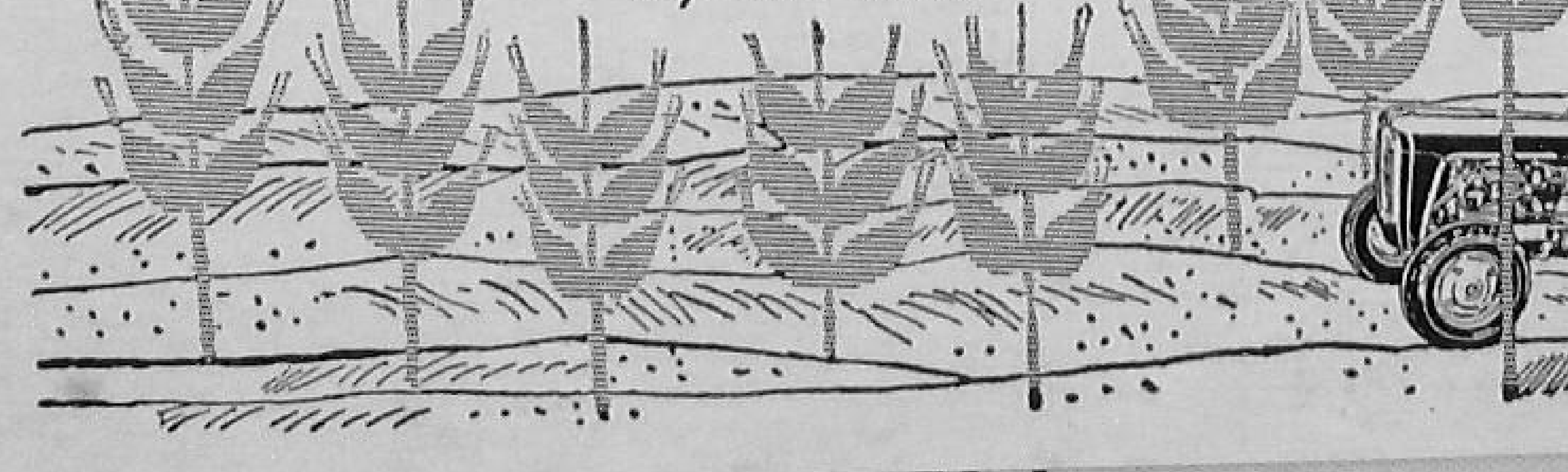

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